Joint Polar Satellite System (JPSS) Proving Ground and Risk Reduction Program

Supporting the NOAA Mission through Applications and Research

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JPSS Program Scientist

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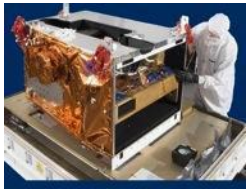
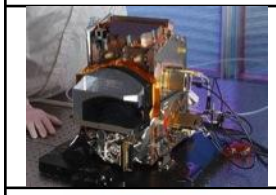
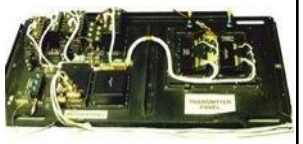
JPSS Overview

- **JPSS consists of five satellites (Suomi NPP, JPSS-1, JPSS-2, FF-1, FF-2), ground system and operations through 2028**
  - JPSS mission is to provide global imagery and atmospheric measurements using polar-orbiting satellites
- **JPSS is a partnership between NOAA and NASA**
  - NOAA has final decision authority and is responsible for overall program commitment
  - NASA is the acquisition agent for the flight system (satellite, instruments and launch vehicle), ground system, leads program systems engineering, and program safety and mission assurance
  - NOAA is responsible for operations, science, **data exploitation** and archiving, infrastructure

S-NPP and JPSS-1 Common Instruments

JPSS Instrument		Measurement
	**ATMS** - Advanced Technology Microwave Sounder	ATMS and CrIS together provide high vertical resolution **temperature** and **water vapor information needed to maintain and improve forecast skill** out to 5 to 7 days in advance for extreme weather events, including hurricanes and severe weather outbreaks
	**CrIS** - Cross-track Infrared Sounder	
	**VIIRS** – Visible Infrared Imaging Radiometer Suite	VIIRS provides many **critical imagery products** including snow/ice cover, clouds, fog, aerosols, fire, smoke plumes, vegetation health, phytoplankton abundance/chlorophyll
	**OMPS** - Ozone Mapping and Profiler Suite	Ozone spectrometers for **monitoring ozone** hole and recovery of stratospheric ozone and for UV index forecasts
	**CERES** - Clouds and the Earth's Radiant Energy System	Scanning radiometer which supports studies of Earth Radiation Budge

Free Flyer Instruments

JPSS Instrument		Measurement
	**SARR** – Search and Rescue Repeater	The Search and Rescue instruments are part of the international Cospas-Sarsat system designed to detect and locate Emergency Locator Transmitters (ELTs), Emergency Position-Indicating Radio Beacons (EPIRBs), and Personal Locator Beacons (PLBs)
	**SARP** – Search and Rescue Processor	
	**A-DCS**- Advanced Data Collection System	The A-DCS provides a worldwide in-situ environmental data collection and Doppler-derived location service with the basic objective of studying and protecting the Earth environment
	**TSIS TIM** – Total & Spectral solar Irradiance Sensor Total Irradiance Monitor	TIM is an active cavity radiometer that monitors changes in Total Solar Irradiance (TSI) at the top of the Earth's atmosphere
	**TSIS SIM** – Total & Spectral solar Irradiance Sensor Solar Irradiance Monitor	SIM is a prism spectrometer that monitors changes in Solar Spectral Irradiance (SSI) as a function of wavelength

NOAA ATMS MIRS Products

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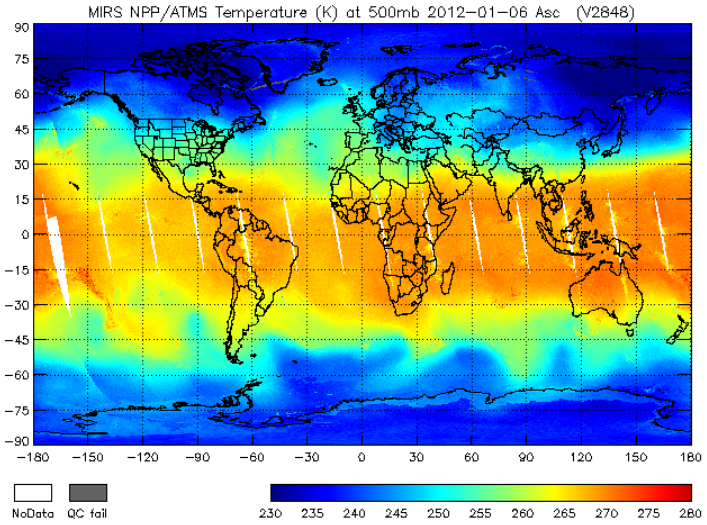
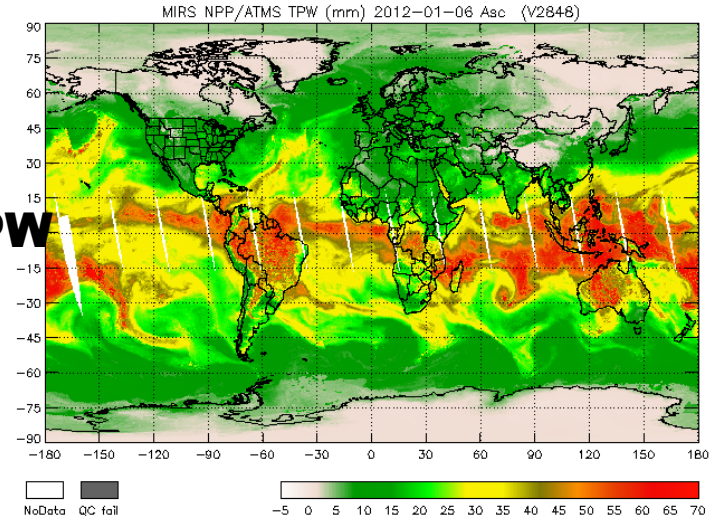
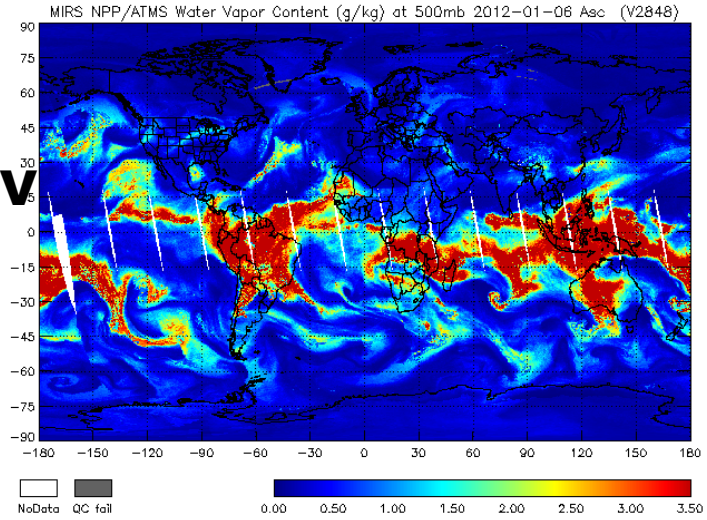


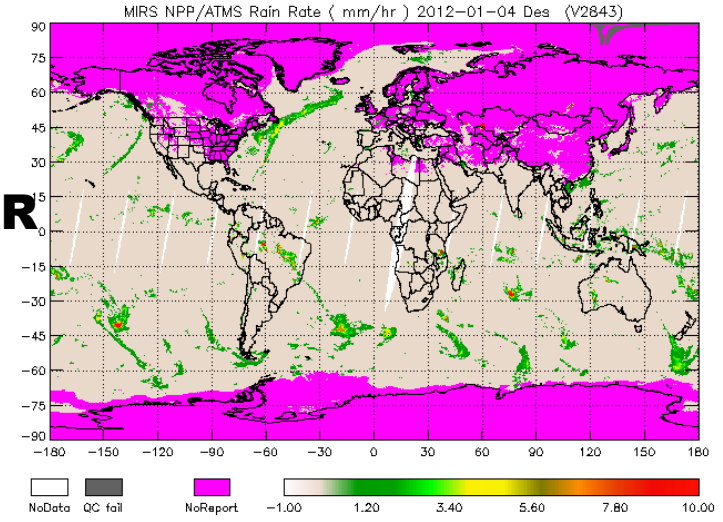
TPW



WV

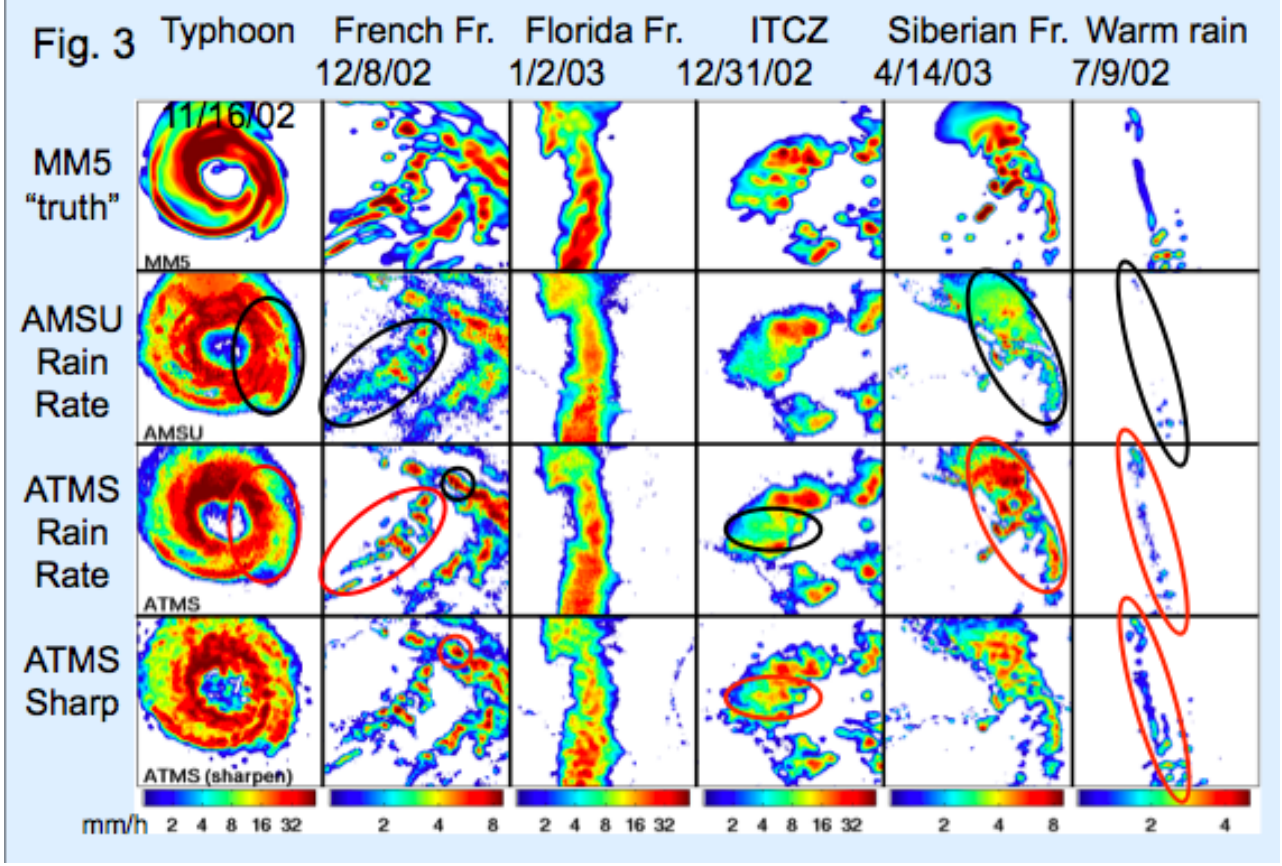


RR



ATMS Storm Mapping: Improvements Relative to AMSU

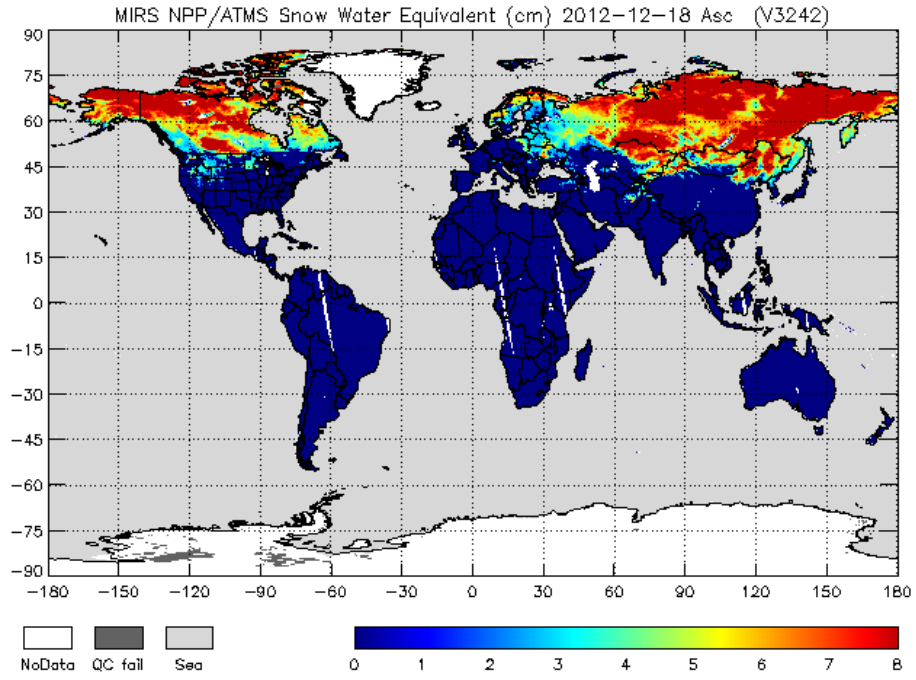
Black and red circles highlight "before" and "after" differences between AMSU and ATMS, and between ATMS and ATMS-sharpened, for six simulated storms validated with AMSU. Note the better definition of strong convective cells with ATMS due to its 33-km resolution and Nyquist sampling, and the better recovery of the warm rain with sharpening

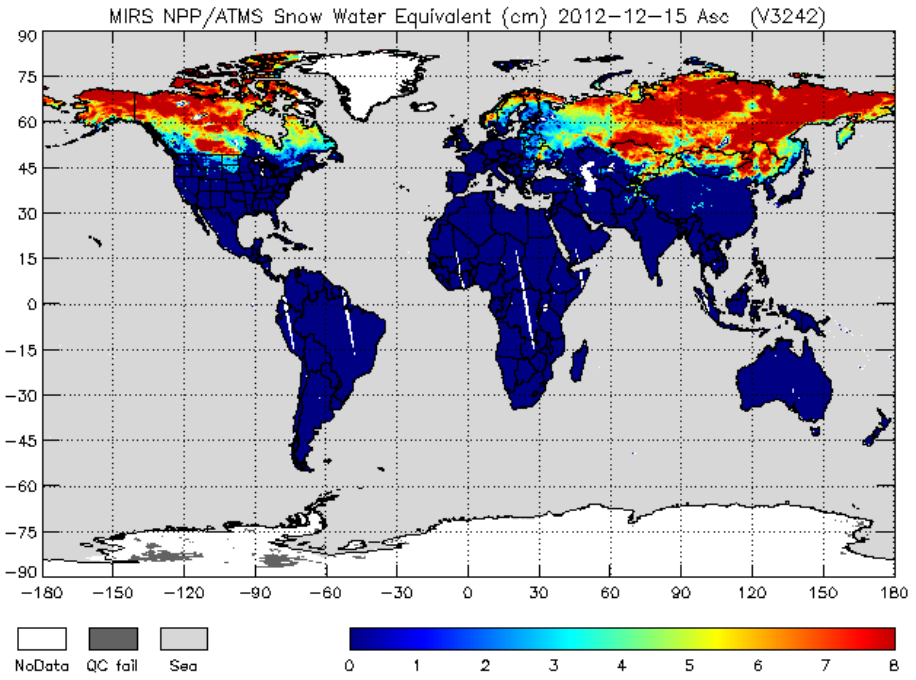


Source: Surussavadee and Staelin, NASA PMM Presentation, 7/08

MiRS SNPP/ATMS-based SWE

Global perspective



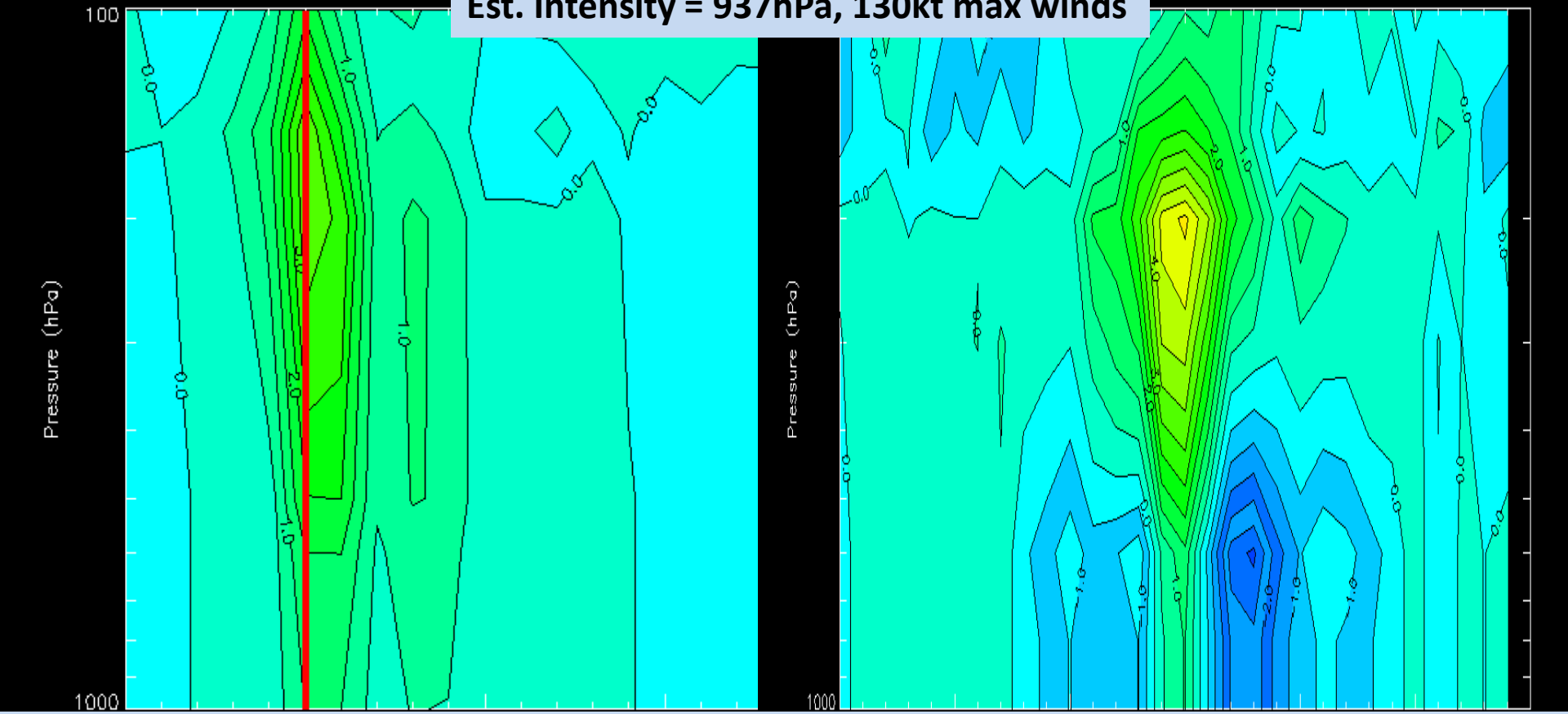


JPSS ATMS-Based TC Intensity Estimates

Calculate TC Warm Core Anomalies from ATMS Microwave Radiances and Relate to Storm Intensity using Method Developed at UW-CIMSS Based on AMSU and SSMIS

AMSU 06UTC Typhoon Bopha, Dec 3 2012 ATMS 04UTC

Est. Intensity = 937hPa, 130kt max winds

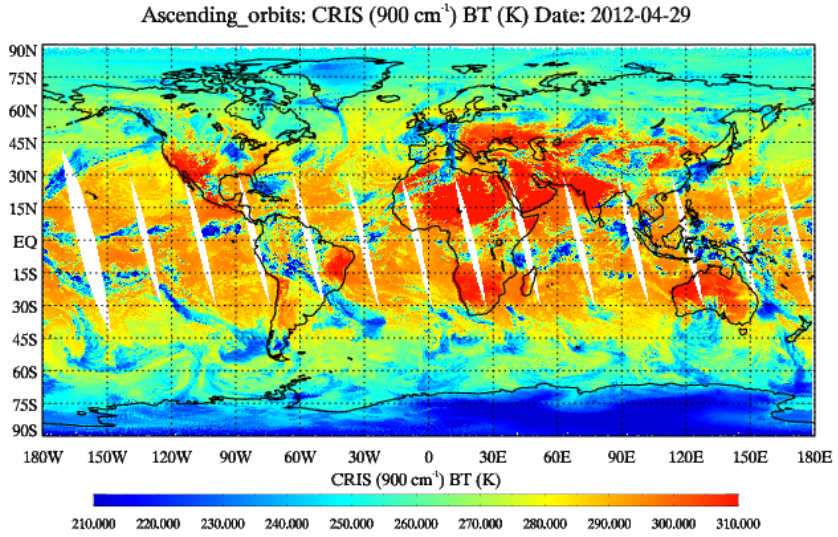


Vertical cross-sections through TC Bopha center (red line on left panel indicates storm center).

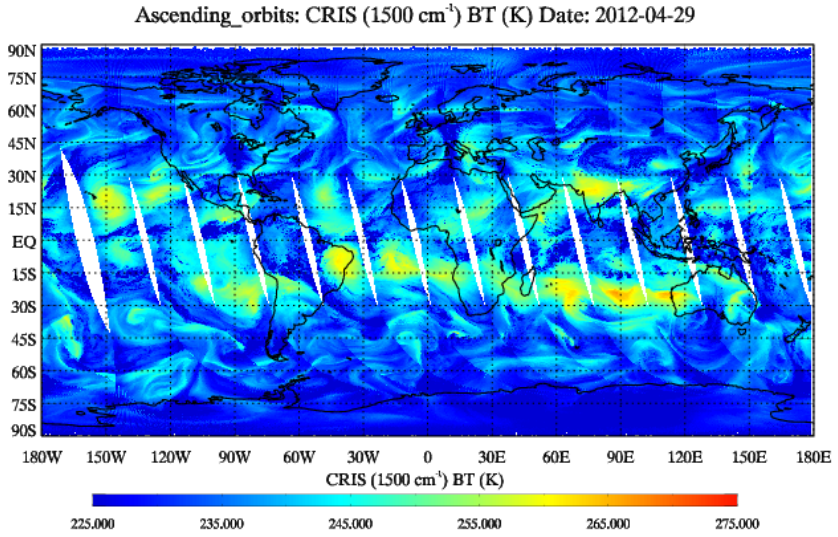
- **Warm anomalies in green/yellows (contour interval=0.5C), with max around 200 hPa.**
- **Correction for rain scattering in ATMS not yet applied (cool/blue signal in lower levels (eyewall).**
- **NPP ATMS FOV resolution is 32km at nadir versus AMSU 48km >> Better depiction of warm core.**

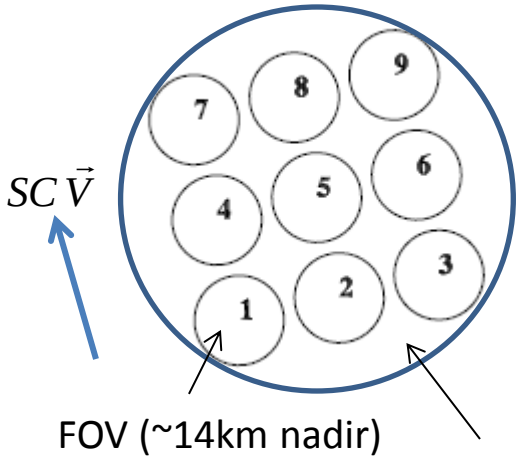
CrIS SDR Spectra and Global Coverage

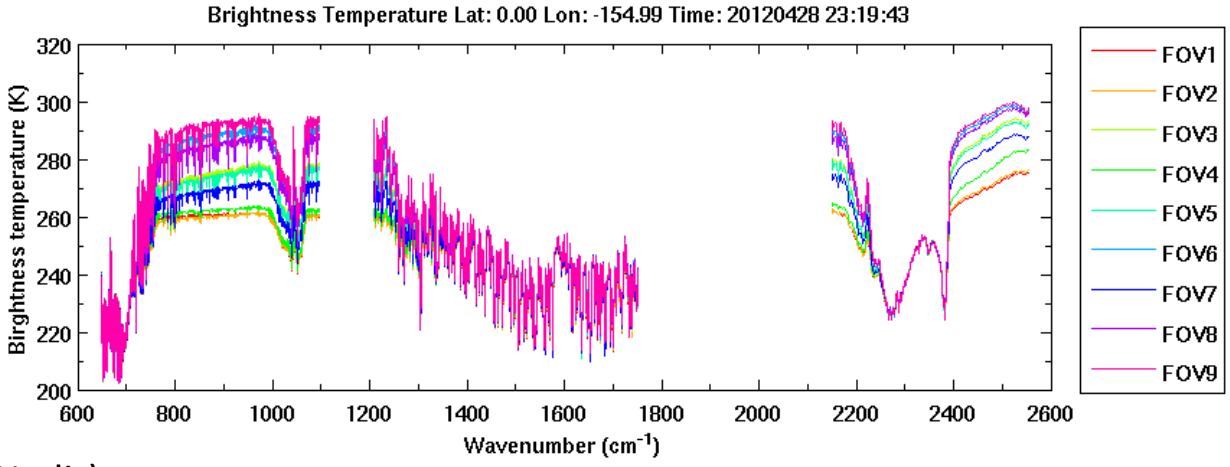
Window Channel



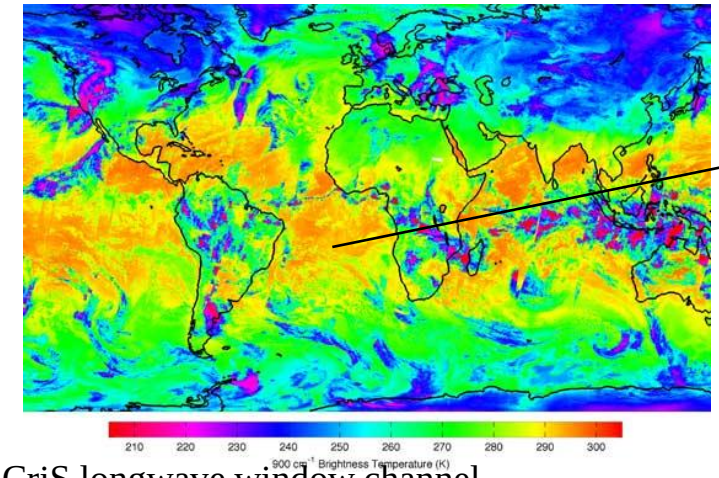
Water vapor Channel

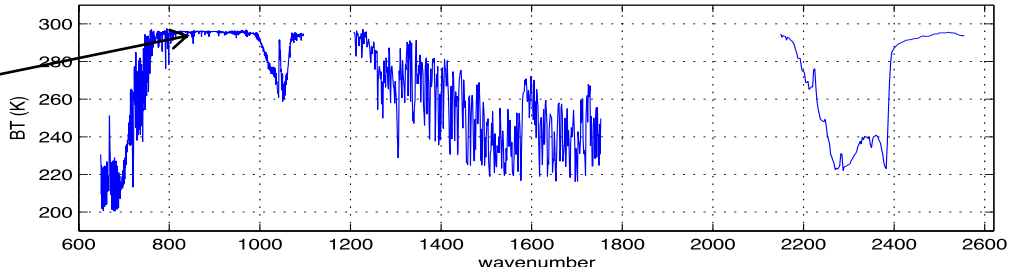




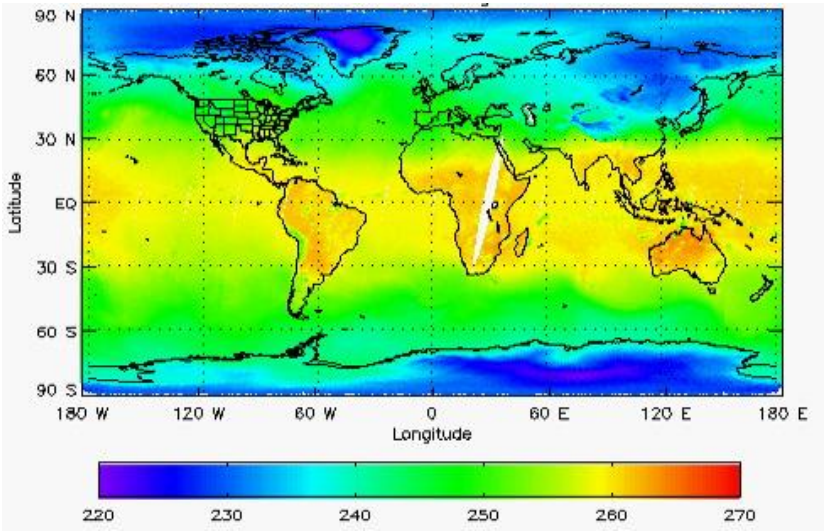


CrIS and ATMS sounders are used together to meet level 1 requirements for temperature and water vapor soundings

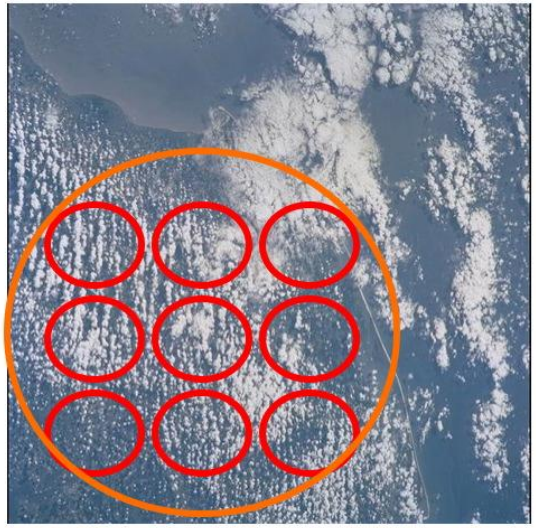




CriS longwave window channel



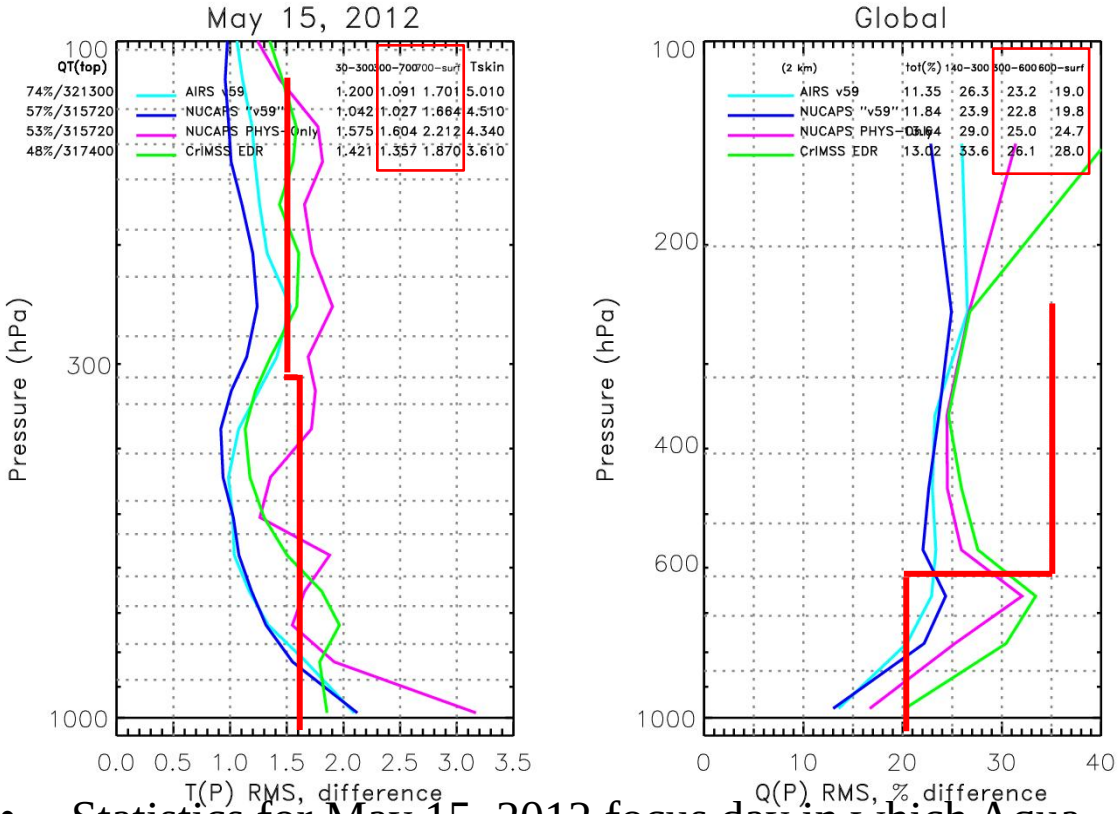
ATMS channel 6 for mid tropospheric temperature



Coalign microwave (larger footprint) with infrared to remove clouds from infrared

Comparison of CrIMSS-EDR, NUCAPS, AIRS

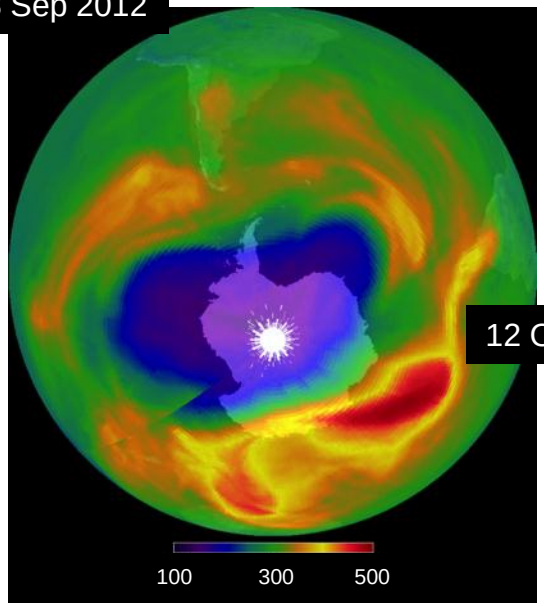
- **AIRS/AMSU v5.9 (CYAN) is AIRS v5 with correction for instrument changes.**
- **NUCAPS "v5.9" uses CrIS/ATMS and the same spectroscopy and retrieval methodology as AIRS v5.9.**
- **NUCAPS PHYS-only has no statistical operators**
- **CrIMSS-EDR (GREEN) results have all changes installed (it is an emulation of Mx7.1 (May 2013) system).**



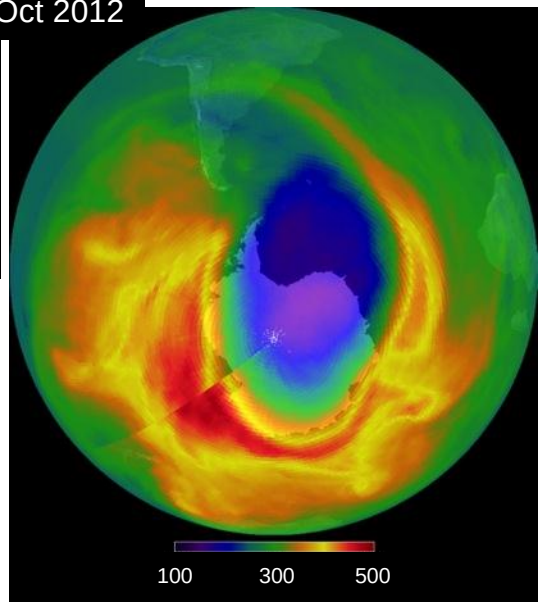
- Statistics for May 15, 2012 focus day in which Aqua and NPP orbits has high coincidence.
- NUCAPS -PHYS(Magenta) and CrIMSS EDR (GREEN) have similar yield and performance
- AIRS v5.9 and NUCAPS statistics are remarkably close

Ozone Monitoring from OMPS

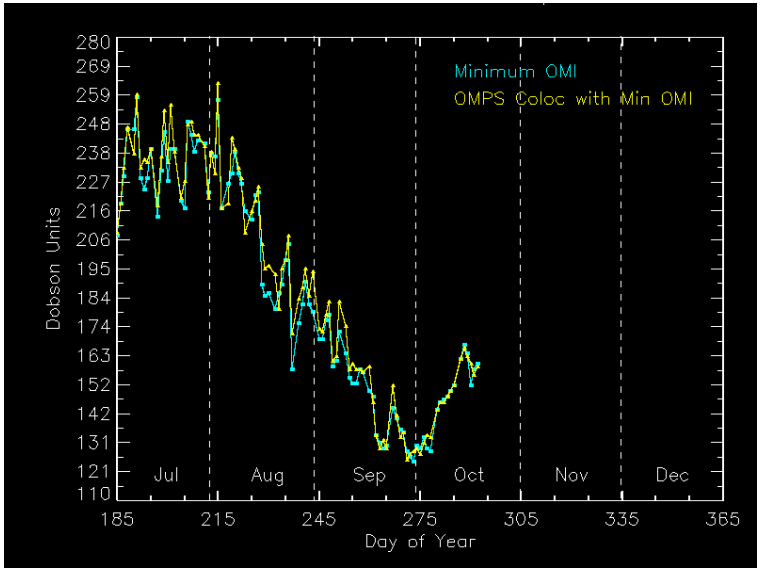
28 Sep 2012



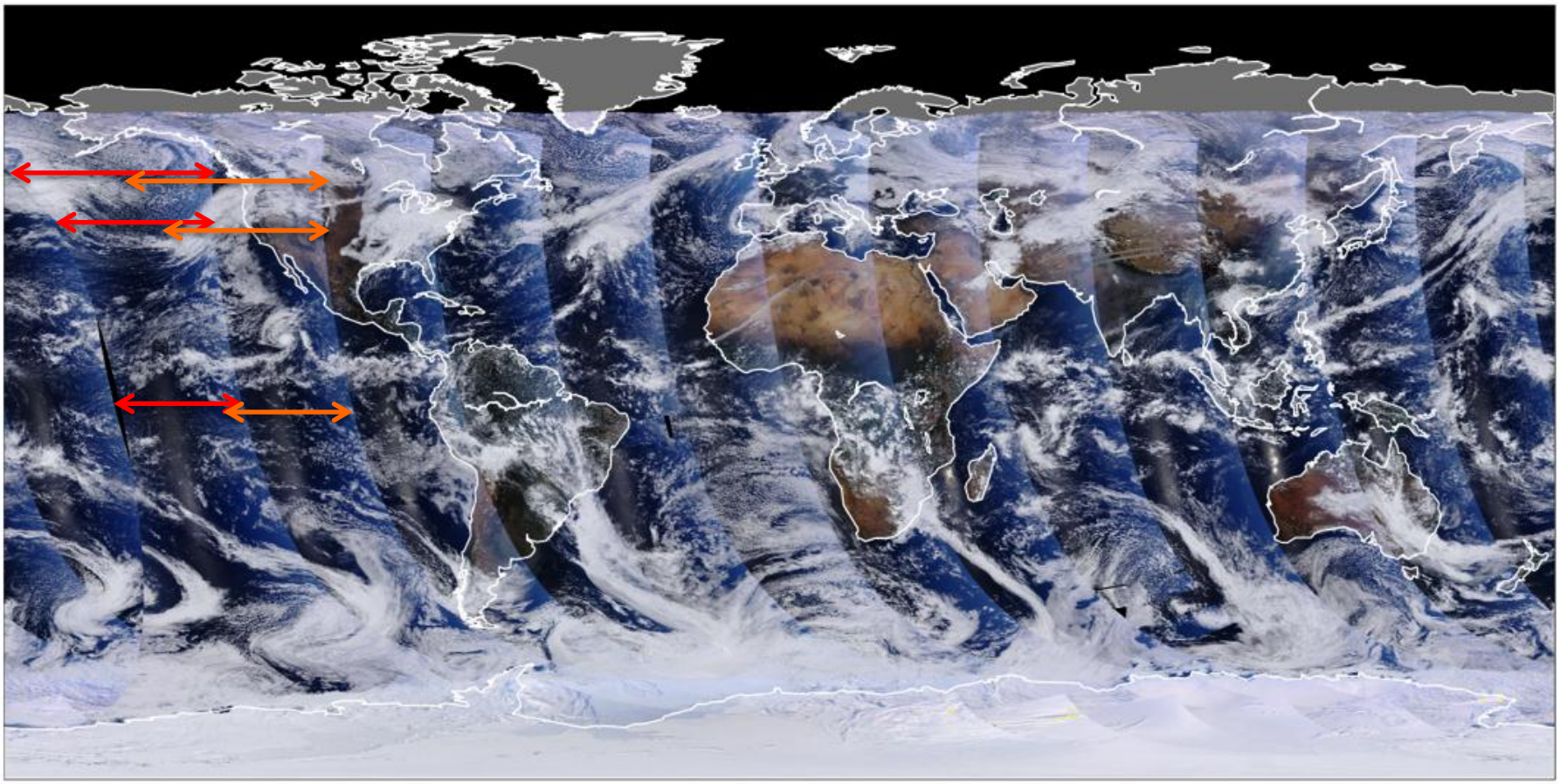
12 Oct 2012



Ozone Hole 2012



VIIRS – the workhorse for environmental assessments



VIIRS RGB (True Color), 20111122

R : M05 (0.672 μm); G : M04 (0.555 μm); B : M02 (0.445 μm)

Creation date: 2011-11-26 07:19:26 Z

Imagery provides large number of environmental products

Land

- ✓ Active Fire
- ✓ Land Surface Albedo
- ✓ Land Surface Temperature
- ✓ Vegetation Index & Fraction
- ✓ Surface Type
- ✓ Ice Surface Temperature
- ✓ Sea Ice Characterization
- ✓ Snow Cover/Depth

Ocean

- ✓ Sea Surface Temperature
- ✓ Ocean Color/Chlorophyll

Clouds

- ✓ Cloud Mask
- ✓ Cloud Optical Thickness
- ✓ Cloud Effective Particle Size Parameter
- ✓ Cloud Top Height
- ✓ Cloud Fraction
- ✓ Polar winds

Aerosol

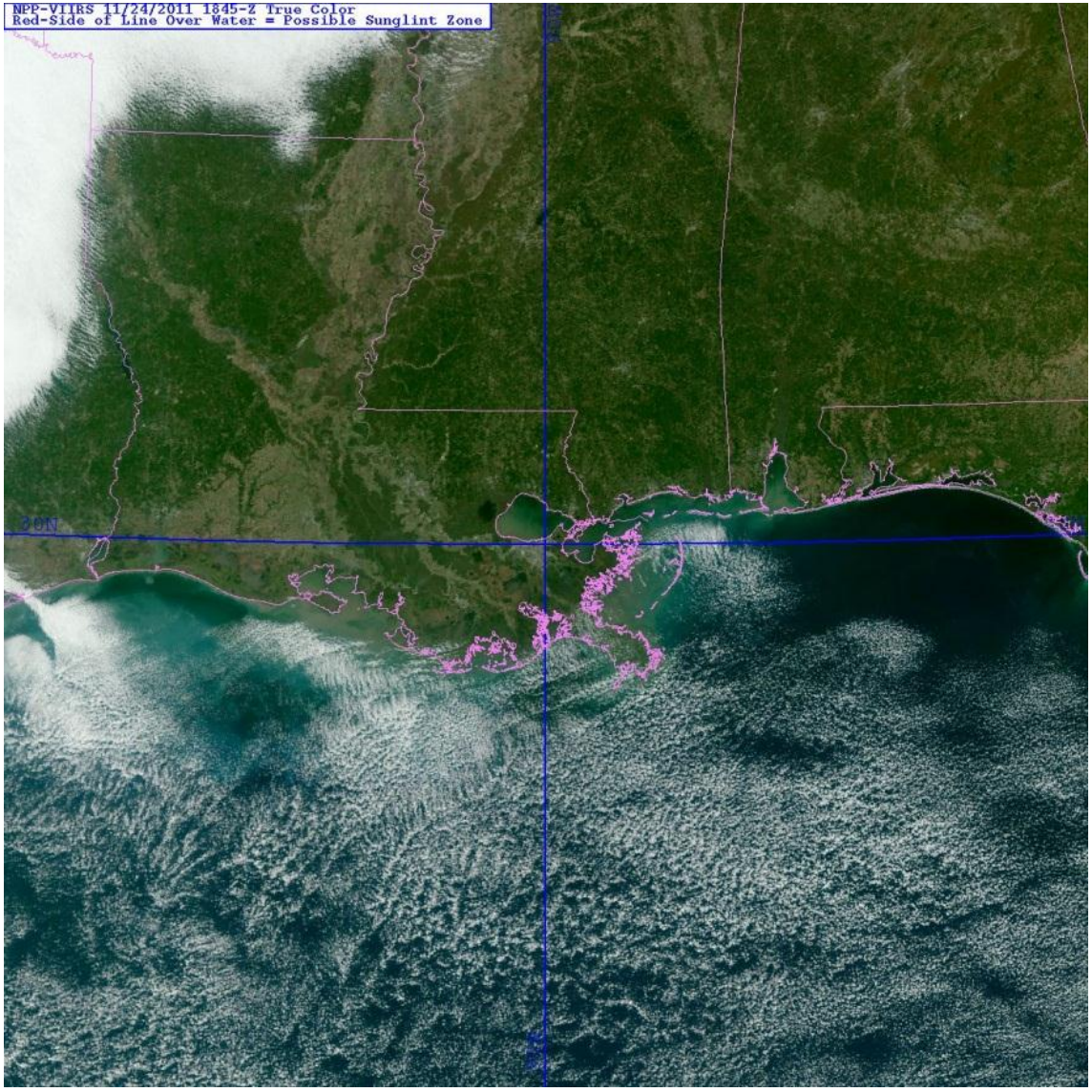
- ✓ Aerosol Optical Thickness
- ✓ Aerosol Particle Size Parameter
- ✓ Suspended Matter (Volcanic Ash)

Multi-spectral Comparisons

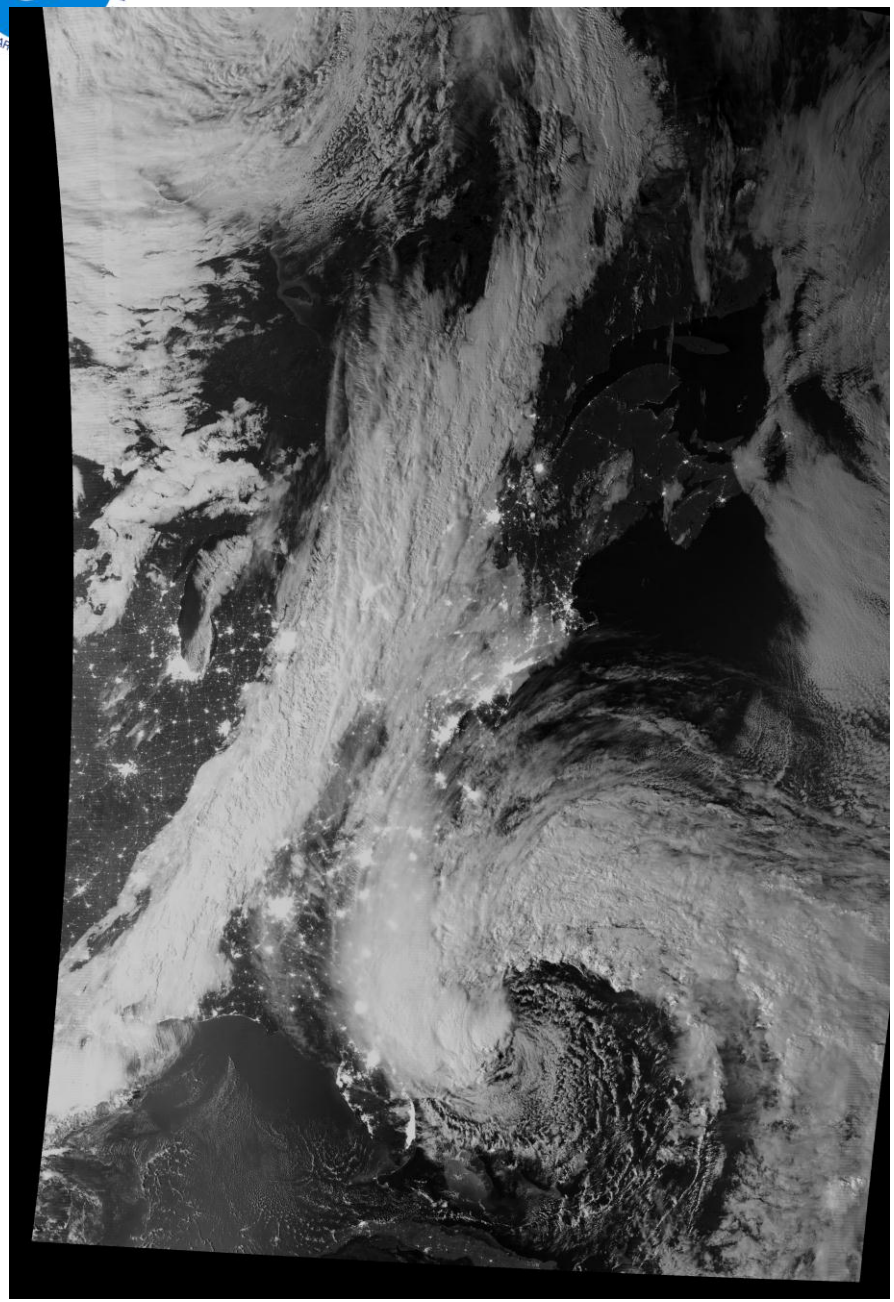
True color – New Orleans

MODIS
1840z

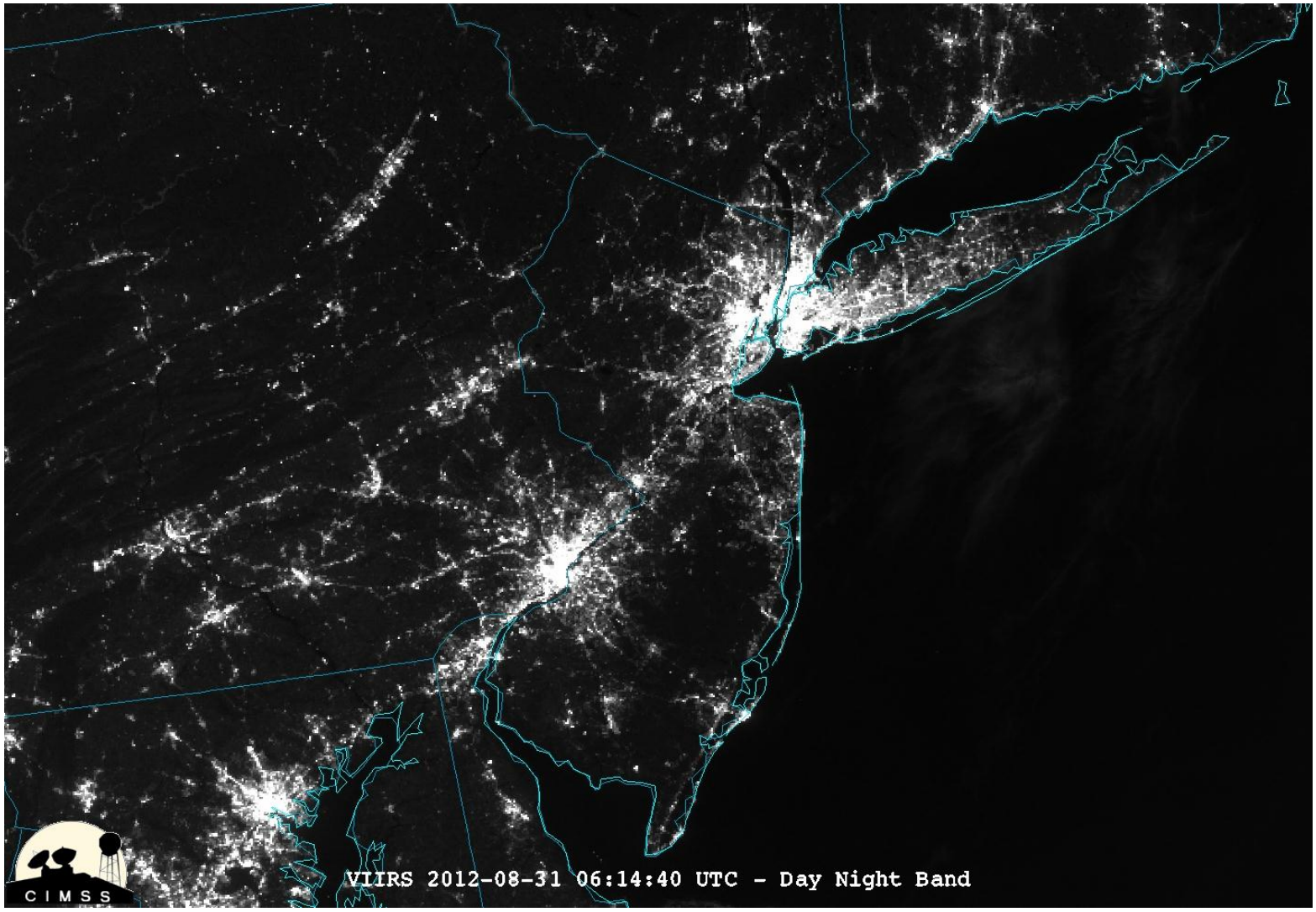
VIIRS
1845Z



Sandy Oct 27 and 28, 2012

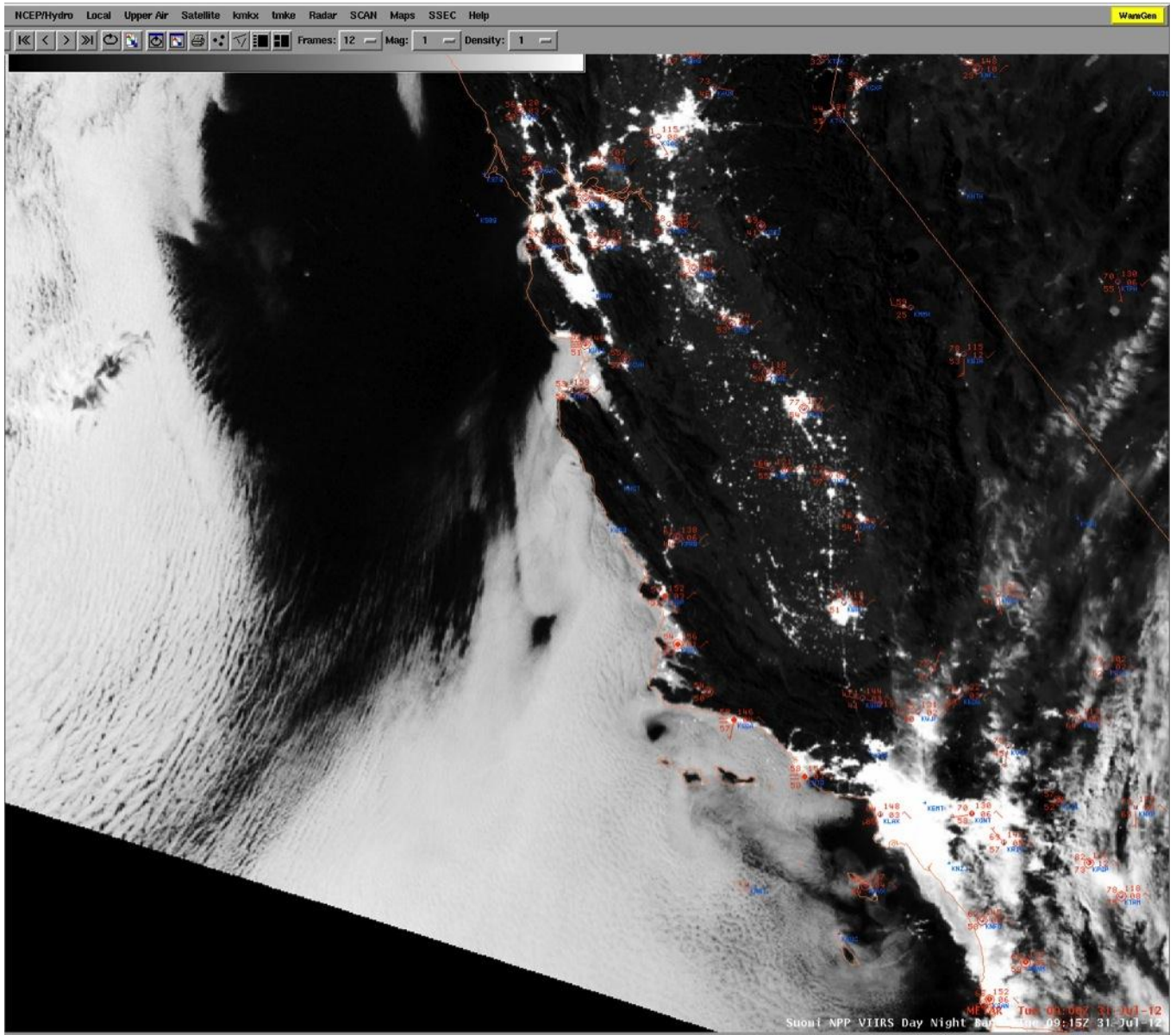


Power outage

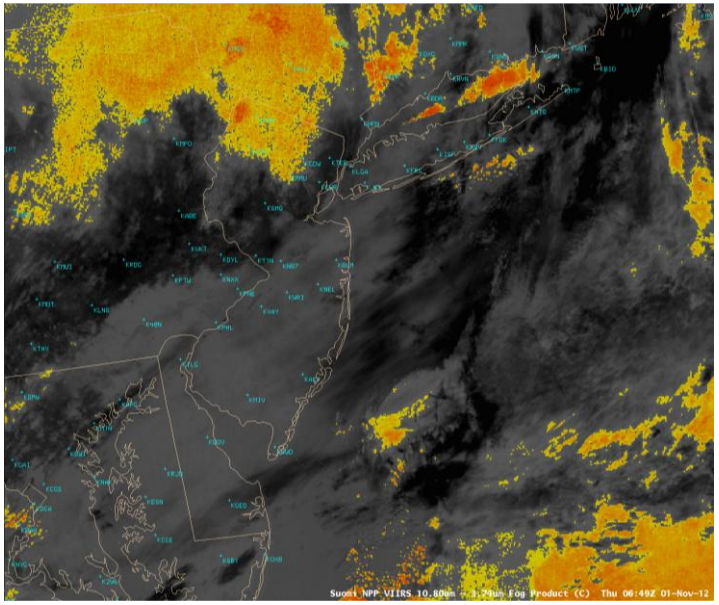


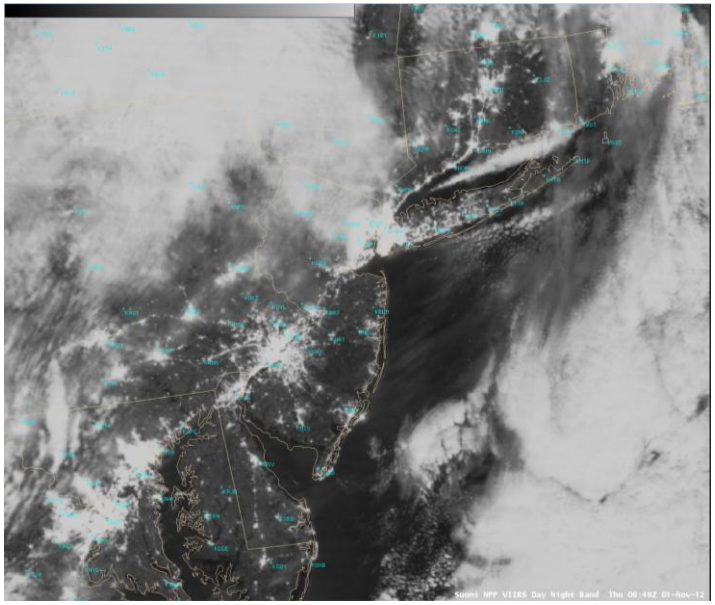
Identifying Maritime Stratus Intrusion at Night 31 July 2012

The National Weather Service Forecast Office in Monterey, California Currently employs the VIIRS DNB to provide higher confidence for issuing marine dense fog advisories



Improved Fog Products – using DNB





Cloud mask: Images show an example how DNB can improve cloud detection. Left image shows difference M12 (3.75um) – M15 (11um) brightness temperature, one cloud test in the current cloud mask. Water clouds appear yellow and red. Right image shows VIIRS DNB, where water clouds are very bright. It can be seen that DNB will detect low-level clouds those are missed in IR.

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JPSS ENVIRONMENTAL PRODUCT PRODUCTION

VIIRS (28 EDRs)

RDR & SDR (for each band)

EDRs

- ACTIVE FIRES
- ALBEDO (SURFACE)
- AEROSOL OPTICAL THICKNESS
- AEROSOL PARTICLE SIZE PARAMETER
- CLOUD BASE HEIGHT
- CLOUD COVER/LAYERS
- CLOUD EFFECTIVE PART SIZE
- CLOUD OPTICAL THICKNESS
- CLOUD TOP HEIGHT
- CLOUD TOP PRESSURE
- CLOUD TOP TEMPERATURE
- CLOUD MASK
- ICE SURFACE TEMPERATURE
- ● IMAGERY
- LAND SURFACE TEMPERATURE
- OCEAN COLOR/CHLOROPHYLL
- QUARTERLY SURFACE TYPE
- SEA ICE CHARACTERIZATION
- SEA SURFACE TEMPREATURE
- SNOW COVER
- SURFACE TYPE
- SUSPENDED MATTER
- VEGETATION INDICES
- *Green Veg Fraction Index*
- *Ocean Color/Chlorophyll*
- *Polar Winds*
- *Sea Surface Temperature*
- *Vegetation Health Index Suite*

GCOM AMSR-2 (11 EDRs)

RDR, *SDR, TDR*

EDRs

- *Cloud Liquid Water*
- *Imagery*
- *Precipitation Type/Rate*
- *Precipitable Water*
- *Sea Ice Characterization*
- *Sea Surface Temperature*
- *Sea Surface Winds-Speed*
- *Snow Cover/Depth*
- *Snow Water Equivalent*
- *Soil Moisture*
- *Surface Type*

CrIS/ATMS (4 EDRs)

EDRs

- *Atm Vert Moisture Profile*
- *Atm Vert Temperature Profile*
- Atm VERT MOISTURE PROFILE
- Atm VERT TEMPERATURE PROFILE

ATMS (11 EDRs)

RDR, ● SDR, TDR

- *Cloud Liquid Water*
- *Imagery*
- *Land Surface Emissivity*
- *Land Surface Temperature*
- *Moisture Profile*
- *Rainfall Rate*
- *Sea Ice Concentration*
- *Snow Cover/Depth*
- *Snow Water Equivalent*
- *Temperature Profile*
- *Total Percipitable Water*

TSIS[1]

RDR & *SDR*

CrIS (4 EDRs)

RDR & ● SDR

CO *CO_2* *CH_4*

Infrared Ozone Profile

A-DCS

PLATFORM REPORTS[4]

SARR & SARP

DISTRESS BEACON REPORTS[5]

OMPS (3 EDRs)

OMPS-N RDR & SDR

OMPS-L RDR[2] & SDR[3]

EDRs

- O_3 TOTAL COLUMN (OMPS-N)
- O_3 NADIR PROFILE (OMPS-N)
- O_3 LIMB PROFILE (OMPS-L)[3]

CERES (2 EDRs)[1]

RDR & SDR

EDRs

- REFLECTED SOLAR RADIATION (TOA)
- OUTGOING LW RADIATION (TOA)

RDR = Raw Data Record
SDR = Sensor Data Record
EDR = Environmental Data Record
TDR = Temperature Data Record
● = EDRs w/Key Performance Parameters
BOLD CAPS = JPSS Ground System EDR
Italics = ESPC EDR

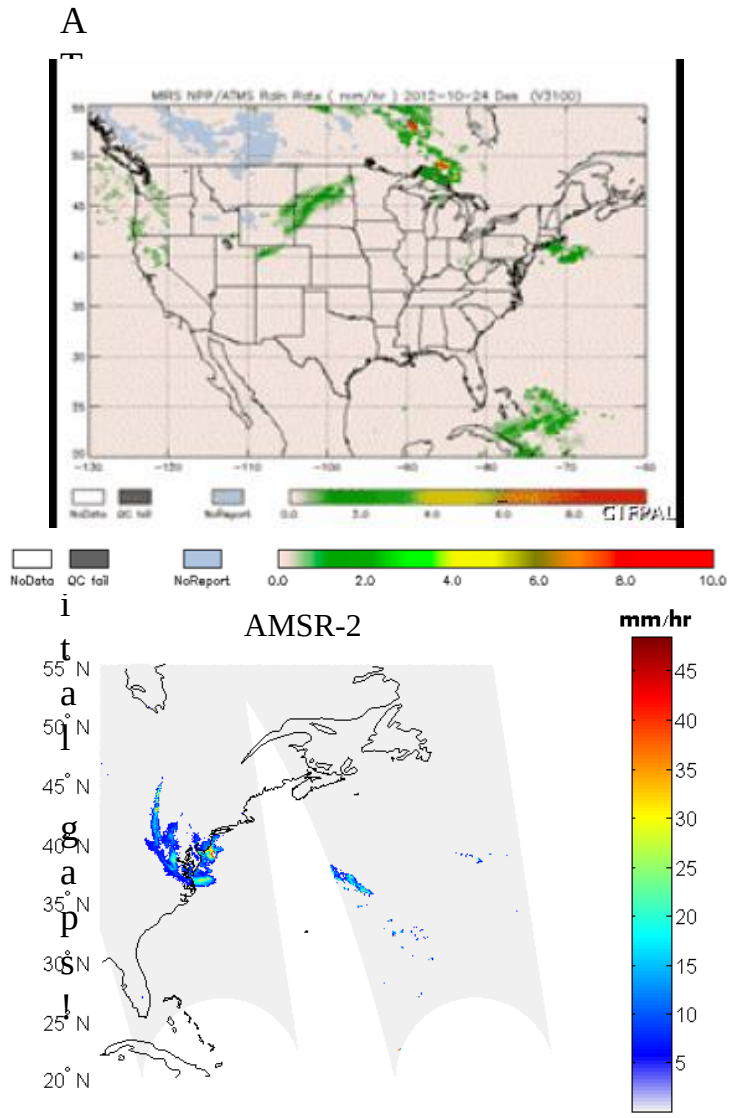
KEY

- JPSS Mission (NPP, JPSS- 1 & 2)
- GCOM-W1 Mission
- Free-flyer Mission

1 CERES and TSIS Climate Data Record (CDR) production is outside the scope of JPSS.
2 NPP and JPSS-2 Threshold requirement.
3 JPSS-2 Threshold requirement. OMPS Limb not flown on JPSS-1.
4 The JPSS program does not process the A-DCS Platform Reports. These reports are downlinked from the spacecraft to the local/regional (HRPT) ground stations who will deliver the data to CLS.
5 The JPSS program does not process the SARR Distress Beacon Reports. These reports are downlinked from the spacecraft to the SARSAT Local User Terminals, which then forward the data to one or more of the SARSAT MCCs.

Suomi NPP and JPSS Hydrological EDRs

- **Precipitable water & cloud liquid water (ATMS, AMSR-2)**
- **Precipitation type and rate (ATMS, AMSR-2)**
- **Snow cover and sea ice characterization (ATMS, AMSR-2, VIIRS)**
- **Snow water equivalent (ATMS, AMSR-2)**
- **Soil Moisture (AMSR-2, ~ VIIRS drought estimates)**
- **Land surface temperature (VIIRS, ATMS)**
- **Land/Surface type (VIIRS, ATMS, AMSR-2)**
- **Vegetation Index, Fraction, and Health (VIIRS)**



Challenge

- **Move from Products to End User Applications**
- **Ensure users are ready for NPP/JPSS data and improve their key operational and research product and services**
  - ✓ Severe weather forecasts and warnings
  - ✓ Aviation weather forecasts and warnings
  - ✓ Improve fire and air quality forecasts and warnings
  - ✓ Improve warnings and prediction of poor water quality in coastal regions
  - ✓ Improve drought, precipitation, snow and ice assessments and predictions
- **Periodic feedback from keys users on the impact of NPP/JPSS data and to identify improvements needed for products and applications**
- **To meet this challenge, the NOAA JPSS Office has established a JPSS Proving Ground and Risk Reduction Program**

Proving Ground and Risk Reduction Application Areas

- **Weather Forecasting (Improving Global, Regional forecasts)**
  - Tropical Cyclones
  - Severe Weather (Nowcasting)
- **Ocean/Coastal (Coral Bleaching, Harmful Algal Bloom alerts)**
- **Land (Droughts, Agriculture)**
- **Hazards (Smoke, Fire, Volcanic Ash, Air Quality)**
- **Hydrological (Precipitation, Floods, Soil Moisture, Snow/Ice, River Ice)**
- **Climate (integrated products, real-time anomaly products)**
- **Education and Training**
- **Infrastructure (Direct Readout and Software (CSPP), Airborne campaigns)**

CSPP is a critical component of the JPSS Proving Ground!

NOAA Near-Real Time Priorities

Critical

RDR, TDR and SDR data required of JPSS:

CrIS	***ATMS***	*AMSR-2/3*
VIIRS	*CERES*	*OMPS-NP*

EDRs required of JPSS:

VIIRS
Imagery EDR
Sea Surface Temperature
Ocean Color/Chlorophyll
Green Vegetation Fraction
Polar Winds

ATMS
Land Surface Emissivity

AMSR-2
Sea Surface Temperature

Additional Capabilities
ADCS Data
SARSAT Data

Supplemental High

RDR and SDR data considered SH for JPSS:

OMPS-L

EDRs considered SH for JPSS:

CrIS/ATMS
Atmospheric Temperature Profile
Atmospheric Moisture Profile

ATMS
Imagery
Cloud Liquid Water
Rainfall Rate
Sea Ice Concentration
Snow Cover
Snow Water Equivalent
Total Precipitable Water

OMPS Nadir and Limb
Nadir Ozone Profile
Ozone Total Column
Ozone Limb Profile

CERES
Outgoing Longwave Radiation
Reflected Solar Radiation

VIIRS
Sea Ice Characterization
Snow Cover
Active Fires
Suspended Matter
Cloud Cover/Layers
Cloud Mask
Cloud Effective Particle Size
Cloud Optical Thickness
Cloud Top Height
Aerosol Optical Thickness

AMSR-2
Sea Surface Wind Speed
Sea Ice Characterization
Precipitable Water
Soil Moisture
Precipitation Type/Rate
Snow Cover/Depth
Snow Water Equivalent

CrIS
Infrared Ozone Profile

Supplemental Low

RDR and SDR data considered SL for JPSS:

EDRs considered SL for JPSS:

ATMS
Land Surface Temperature
Moisture Profile
Temperature Profile

CrIS
Trace Gases (CO, CO2, CH4)

VIIRS
Aerosol Particle Size
Vegetation Index
Land Surface Type
Land Surface Temperature
Surface Albedo
Atmospheric Pressure Profile
Cloud Top Temperature
Cloud Top Pressure
Cloud Base Height
Ice Surface Temperature
Quarterly Surface Type
Vegetation Health Product Suite

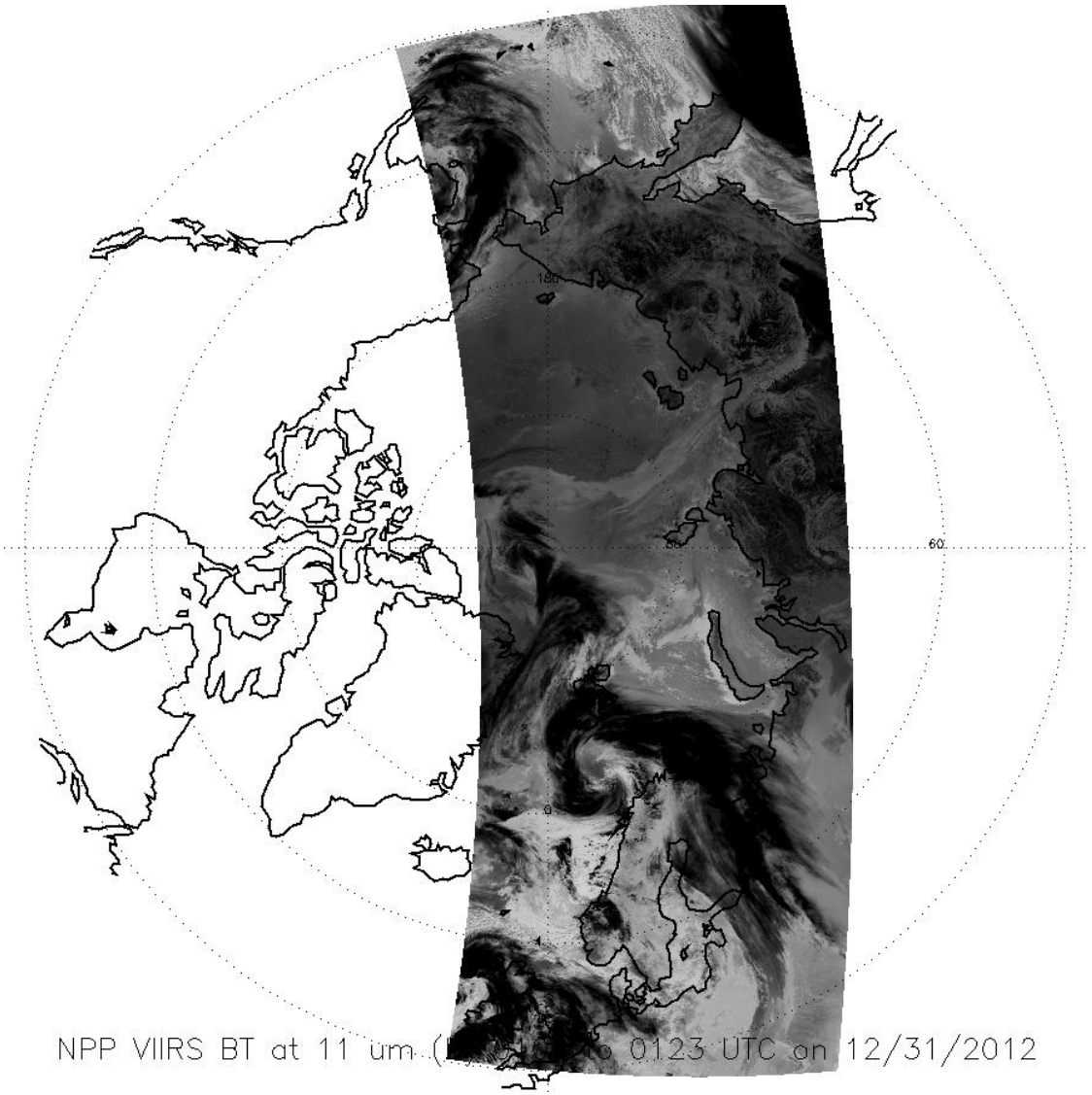
AMSR-2
Surface Type

NOTE: Near Real Time implies that the product is required by the operational Line Office within a short latency (30-120 minutes). These Line Offices are: NWS, NESDIS, NOS, and NMFS.

JPSS Supporting Weather Ready Nation through VIIRS

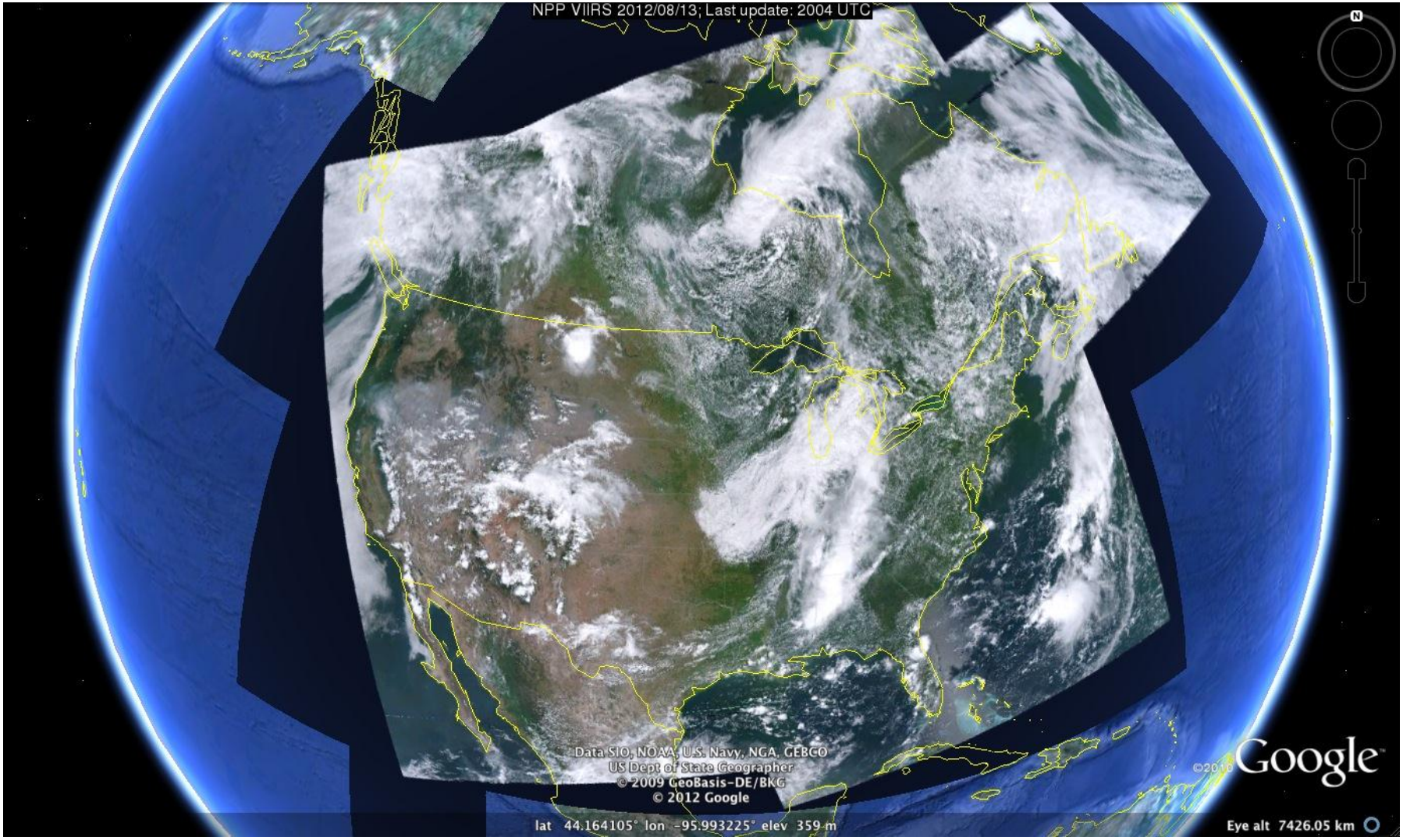
VIIRS provides critical visible and IR imagery which supports weather forecasting at polar latitudes.

This real-time use of VIIRS S-NPP data is only possible with the use of Direct Broadcast.

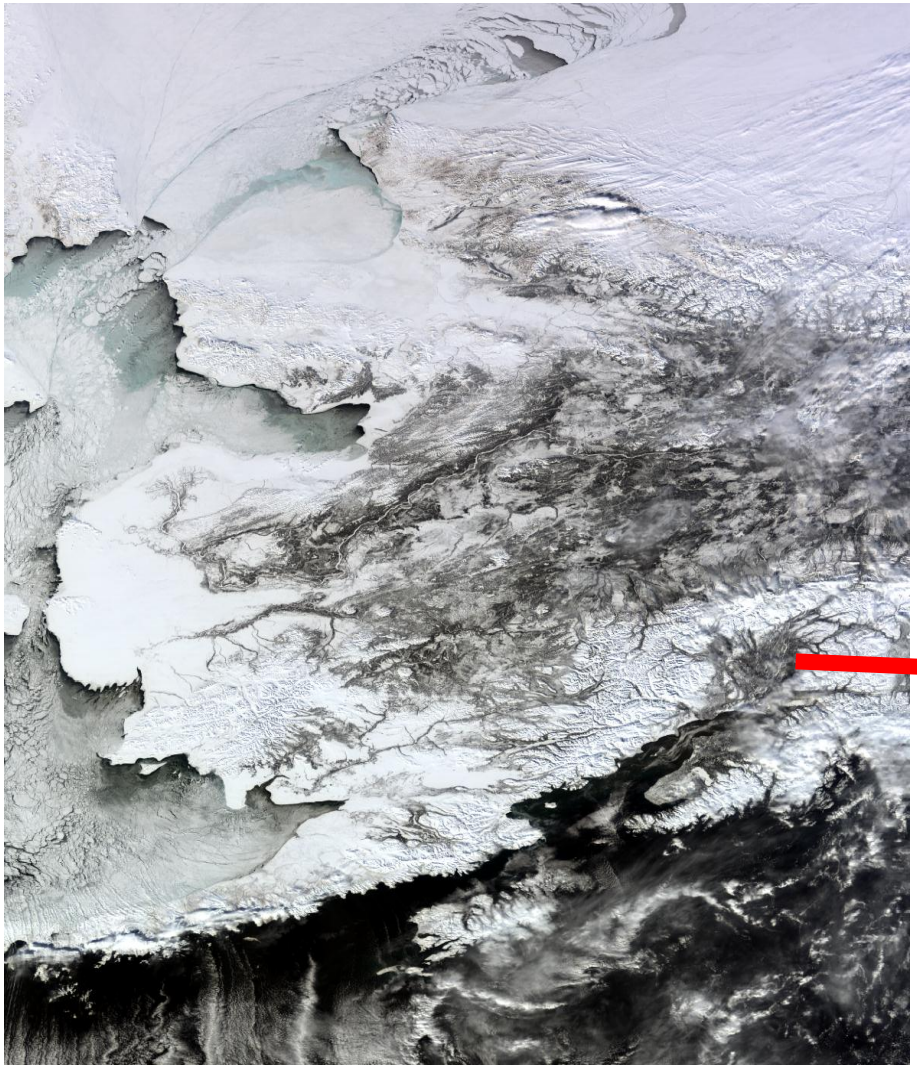


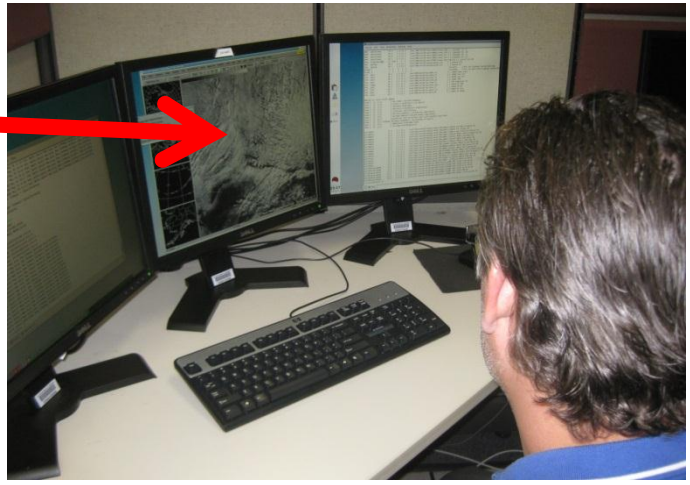
Direct Broadcast Through the CSPP

Data Faster - Greater Operational Impact

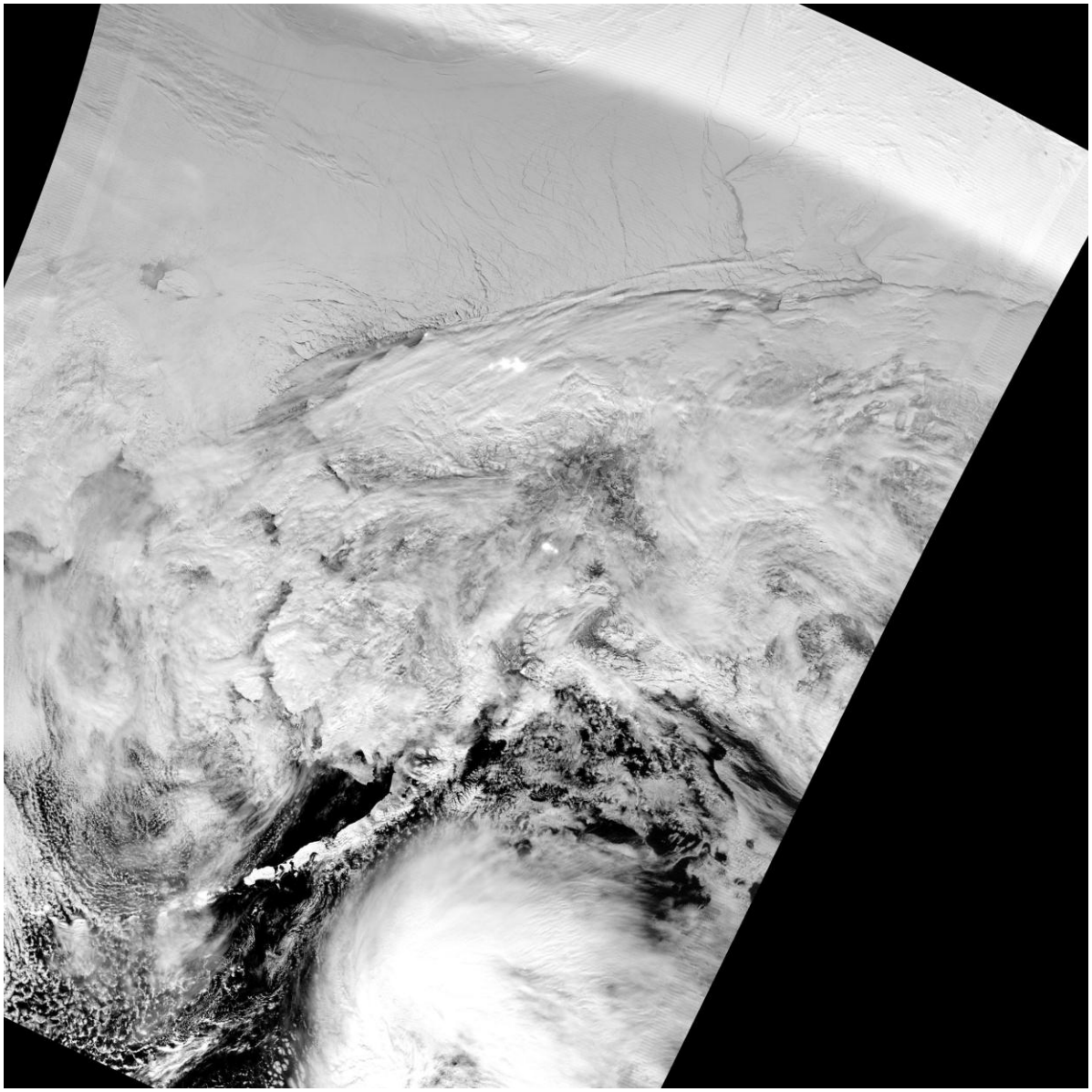


University of Alaska Provides Real-Time VIIRS imagery to Alaska WFOs





Day Night Band 12/31/12



VIIRS Used by Alaska NWS

12 November 2012

FXAK67 PAJK 211453

AFDAJK

SOUTHEAST ALASKA FORECAST DISCUSSION

NATIONAL WEATHER SERVICE JUNEAU AK

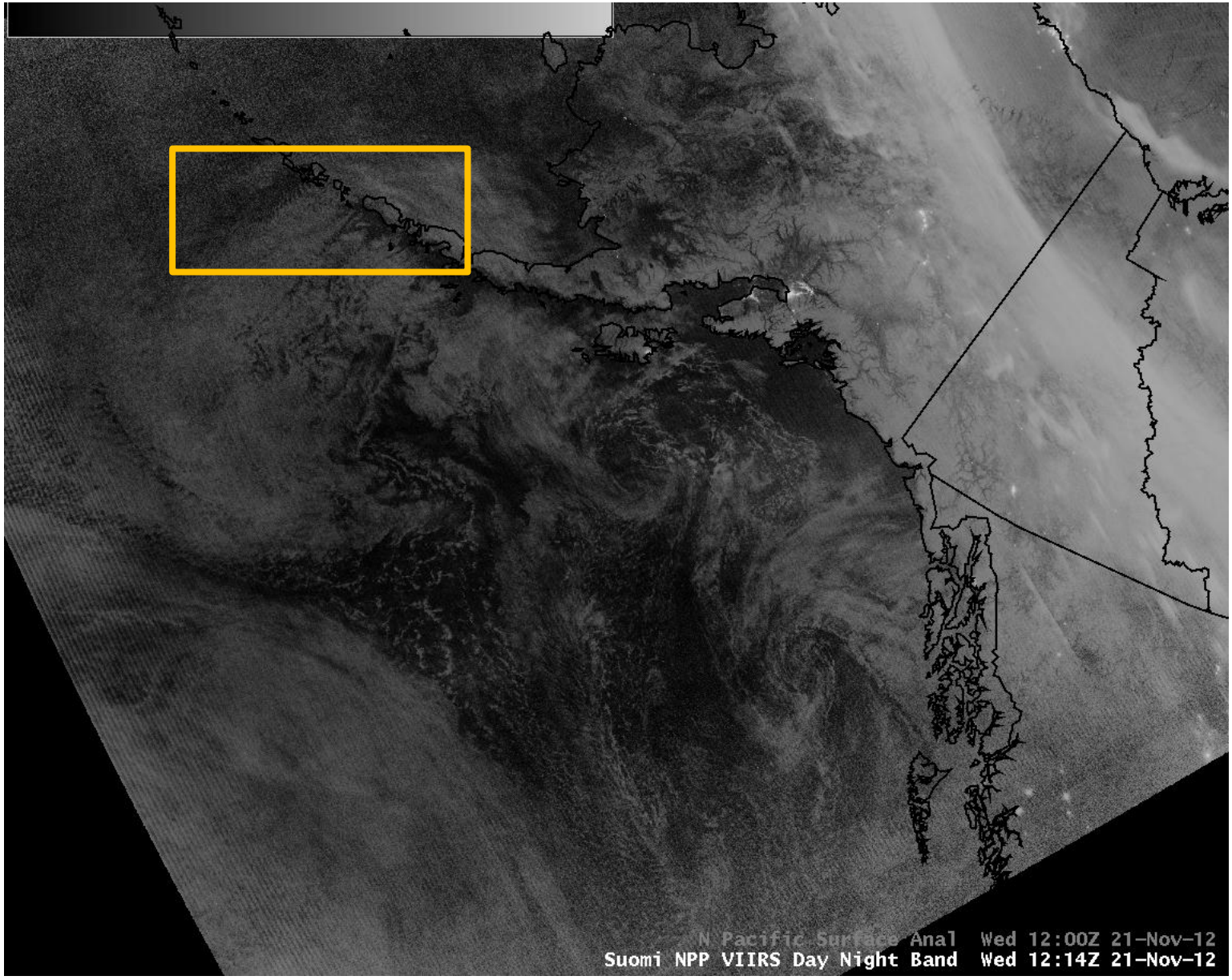
553 AM AKST WED NOV 21 2012

.SHORT TERM...SOMEWHAT COMPLICATED PATTERN IN THE GULF AND NORTHEAST PACIFIC THIS MORNING. THERE ARE AROUND 4 SEPARATE CIRCULATION CENTERS VISIBLE ON IR AND VIIRS NIGHTTIME VISIBLE IMAGES. THE STRONGEST IS WEST OF DIXON ENTRANCE CURRENTLY AND IS SLOWLY WEAKENING AS IT REMAINS NEARLY STATIONARY. A SECOND LOW IS JUST SE OF KODIAK ISLAND, A THIRD IS AROUND 50N 140W, AND THE FOURTH IS A VERY WEAK ONE OVER HAIDA GWAII. THEY ARE RESPONSIBLE FOR THE SHOWERS THAT ARE OVER THE SOUTHERN INNER CHANNELS AT THE MOMENT. KETCHIKAN AND ANNETTE HAVE BEEN REPORTING RAIN MOST OF THE MORNING AND THE RADAR SHOWS SOME SHOWERS AROUND SOUTHERN BARANOF ISLAND AS WELL. PRECIP AMOUNTS HAVE BEEN LIGHT FOR THE MOST PART. THESE FEATURES WILL CONTINUE TO WEAKEN OVER THE NEXT 12 TO 18 HOURS AS A DEVELOPING LOW IN THE NORTH CENTRAL GULF BEGINS TO SPREAD ITS INFLUENCE INTO THE GULF.

Using current direct broadcast architecture, the National Weather Service Forecast Office in Juneau, Alaska leveraged S-NPP data to isolate areas of interest that are prominently identified in the VIIRS DNB

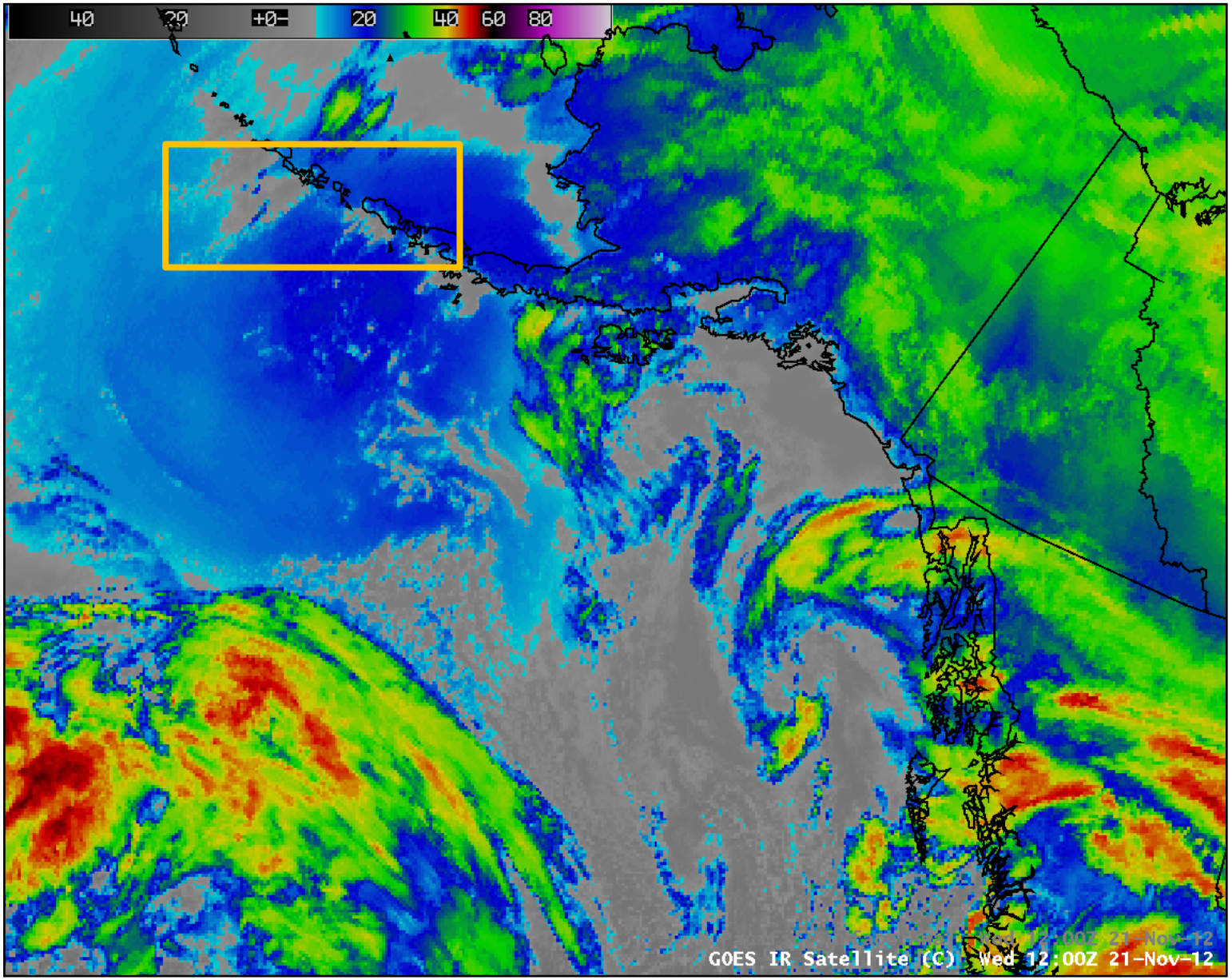
VIIRS Used by Alaska NWS

12 November 2012



VIIRS Used by Alaska NWS

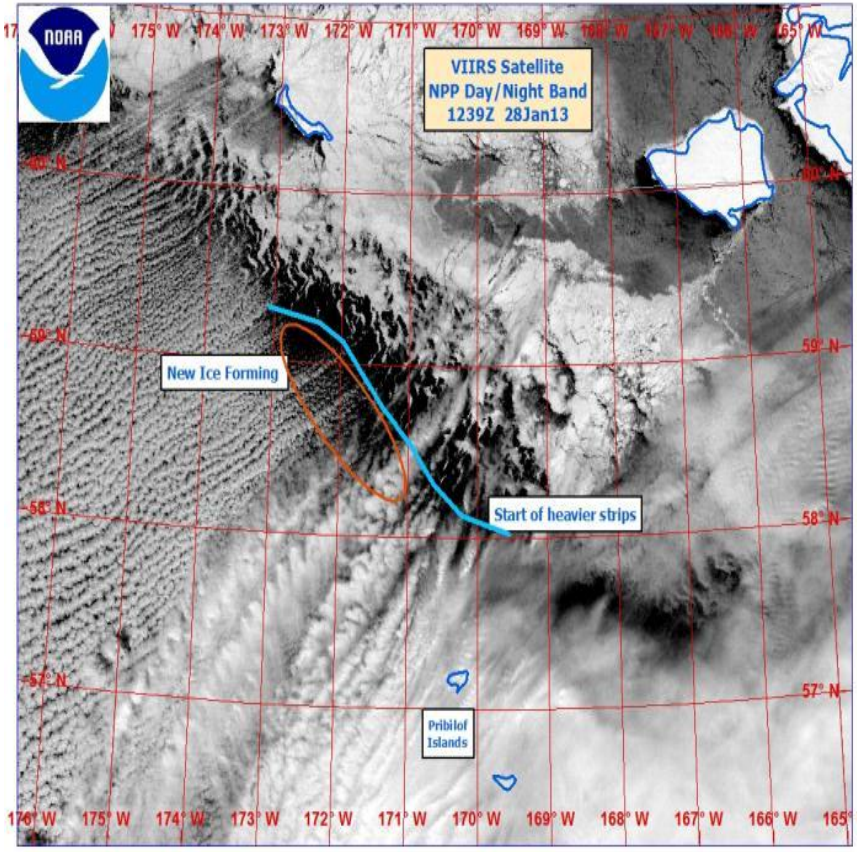
12 November 2012



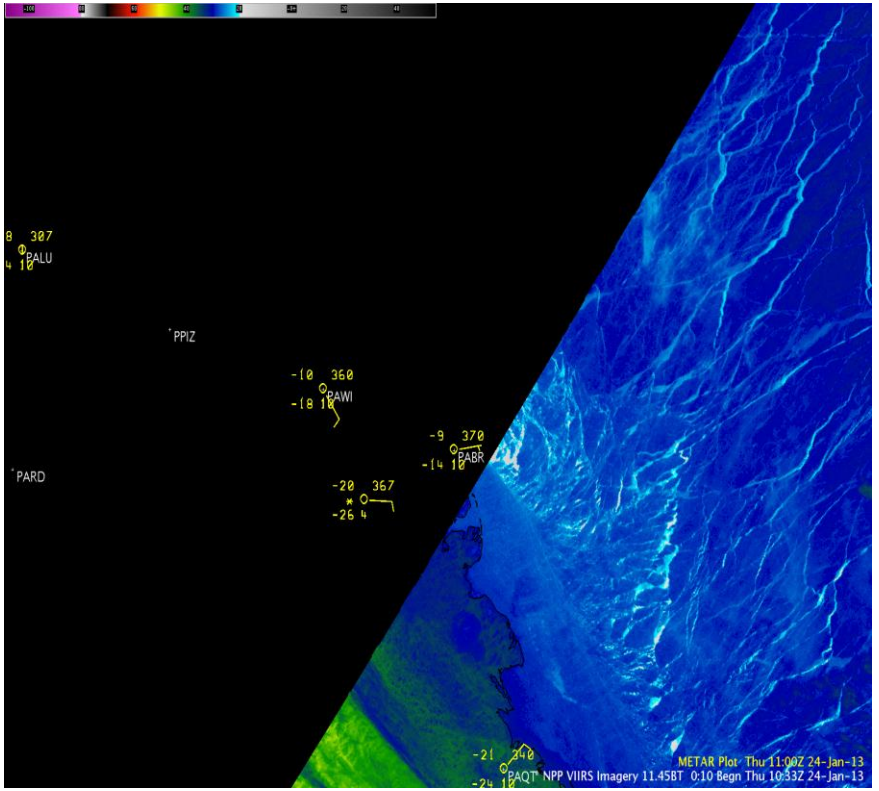
NWS in Alaska, through the JPSS Proving Ground, has become a primary and proactive user of VIIRS products and imagery.

The examples demonstrates exploitation of critical data for arctic access and navigation, and safe transportation.

VIIRS being used for sea ice analysis



VIIRS animation showing strong Easterly Flow (Polynyas* and Leads) in Ice.



* An area of open water surrounded by sea ice. It is now used as a geographical term for an area of unfrozen sea within the ice pack.

LocalForecast by City, St or Zip Code

City, St Go

Forecasts/Products
Public
Forecast Discussion
- With Glossary
Aviation
Marine
Hydrology(RFC)
Rivers & Lakes AHPS
Ice Desk
TV Weather
Fire Weather
Avalanche
Travel 511
Graphical
XML RSS Feeds
Marine FTPMail

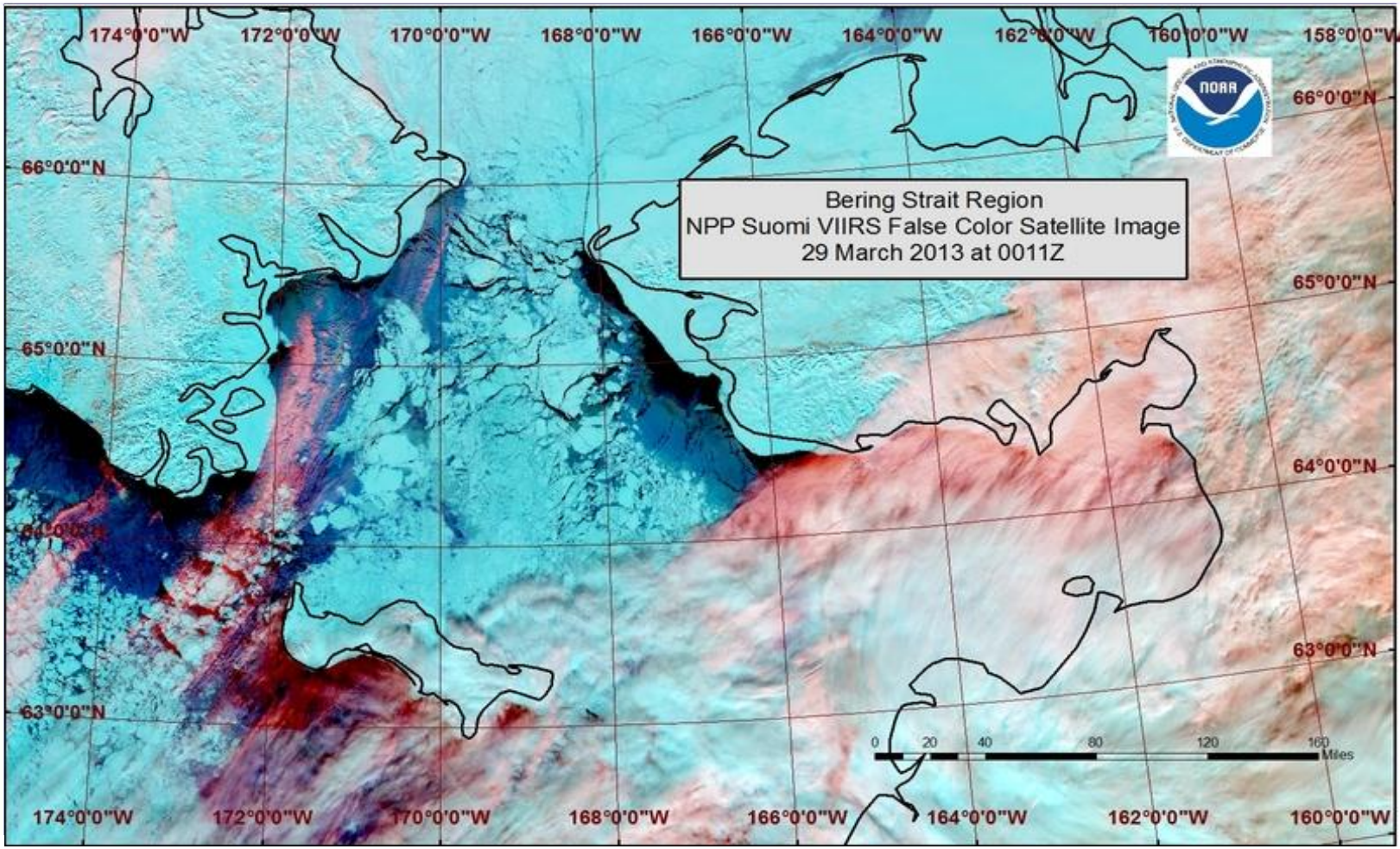
Data
Vent Factor
Mesonet
Model Graphics
Local Model
Observations
Marine Obs
Satellite/Radar
Soaring Index
Weather Links

Climate
PAFC Climate
Interactive Climate
PAFC Records

Satellite Ice Imagery

This page is used to post satellite images of sea ice. Resolution of the images ranges from 250 meters to 4 kilometers. Sources for the imager
POES AVHRR from NWS Alaska Region. Images are added to this page as cloud cover and time permit.

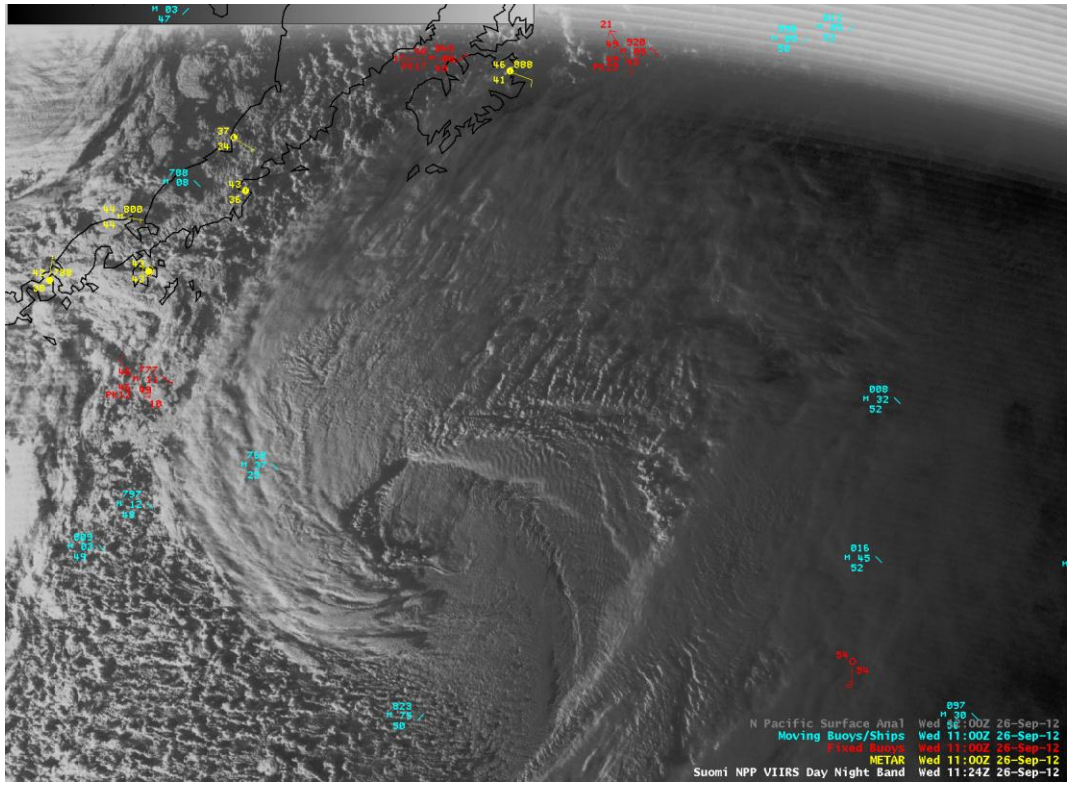
Click on each image for a larger view:

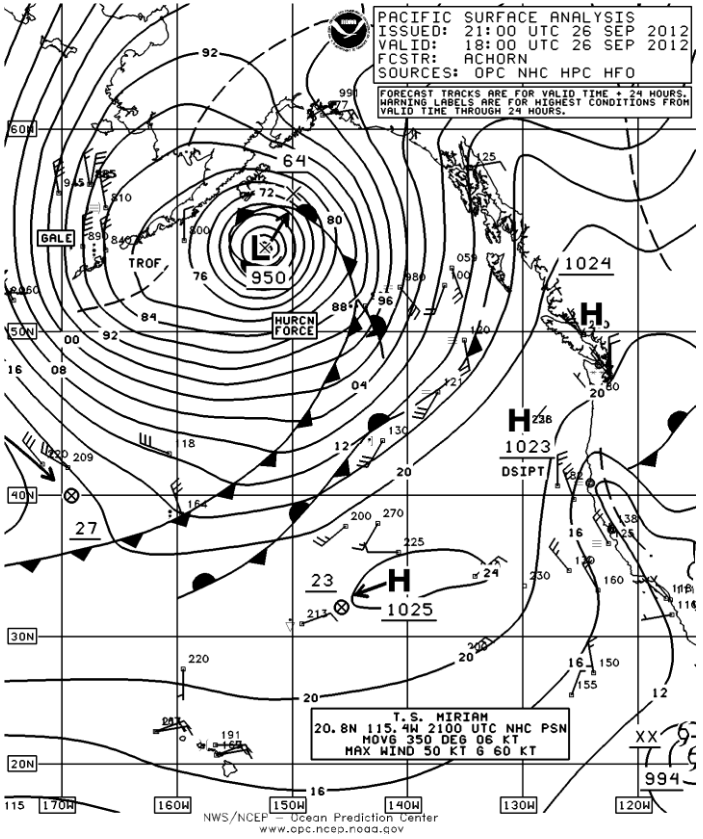


Weather Forecast Applications – Sounder Quantification of Imagery

Gulf of Alaska low pressure system (26 Sept 2012)

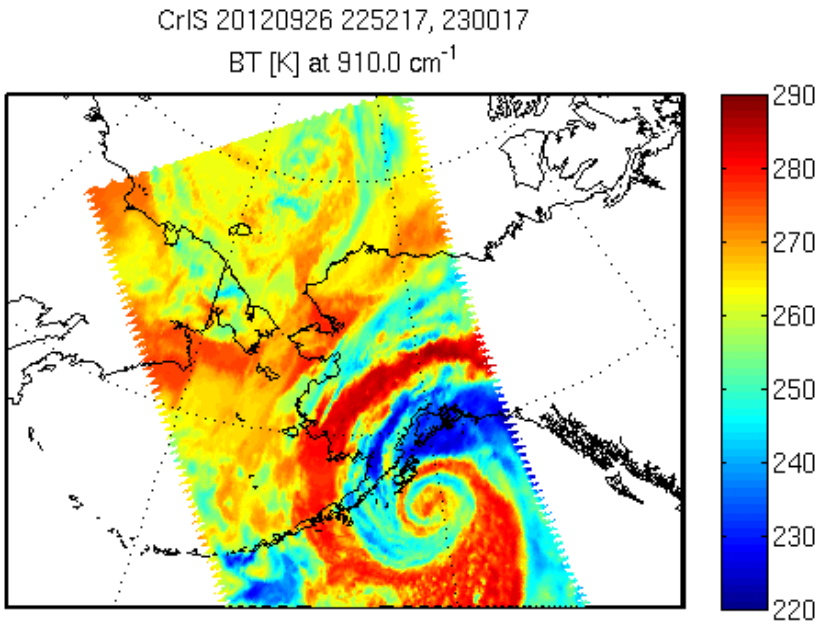
Suomi NPP VIIRS 0.7 μm Day/Night Band and 11.45 μm IR channel

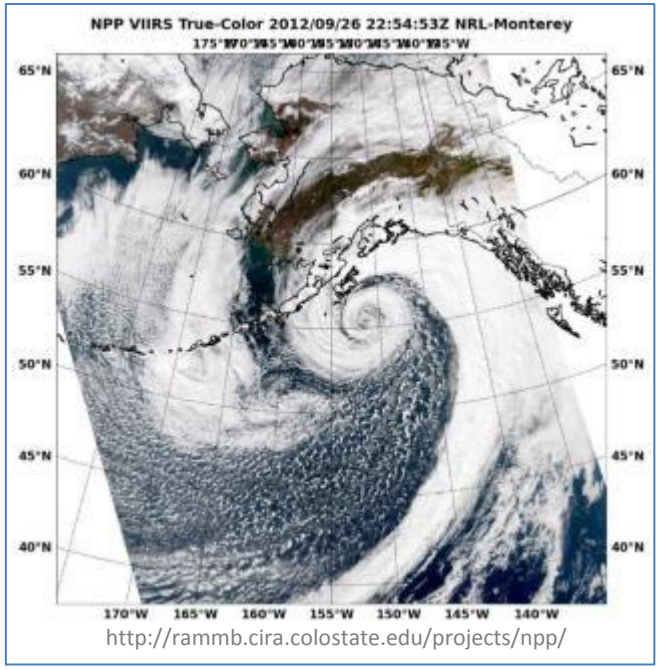


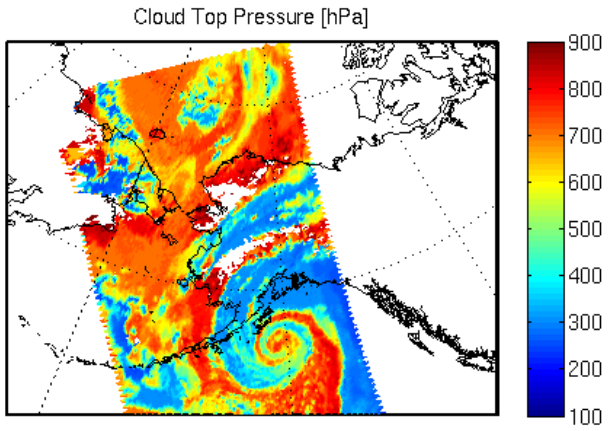


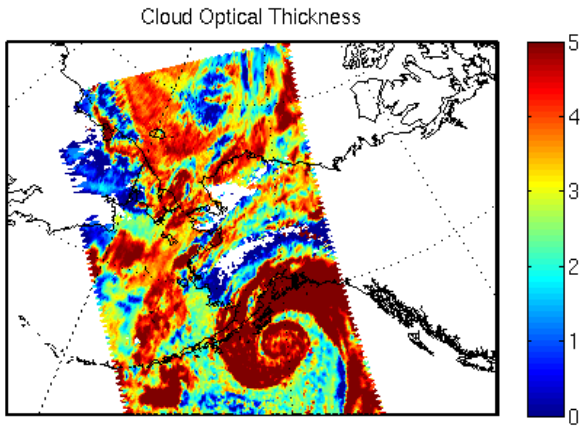
From: http://cimss.ssec.wisc.edu/goes/blog/archives/date/2012/09/26

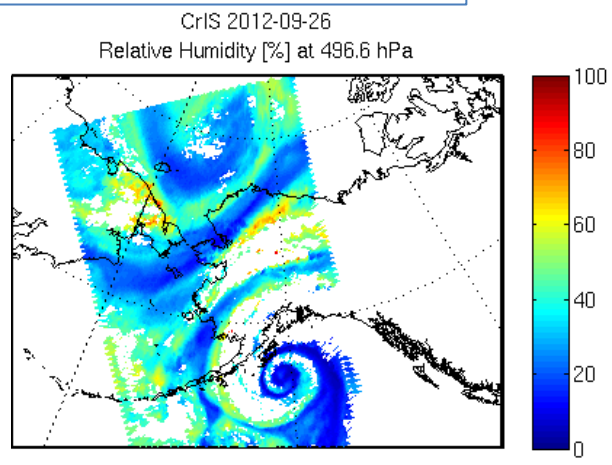
Gulf of Alaska Low Pressure System (26 Sept 2012)





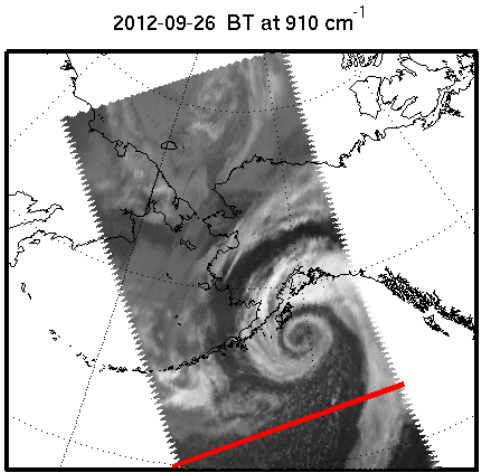


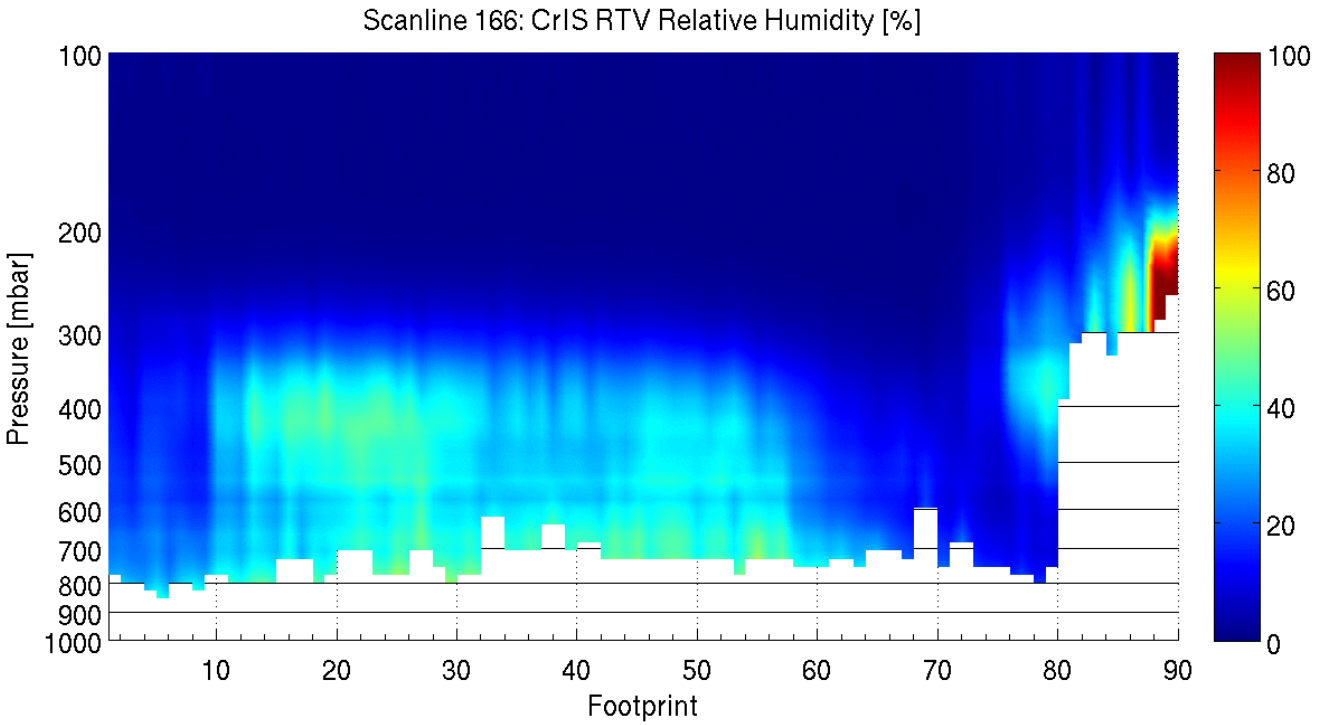




Sounding retrievals provide quantitative interpretation of satellite imagery

RH south-north cross-section Movie (26 Sept 2012)





Sounding retrievals provide 3-d structure of storm systems

NOAA User Latency Requests

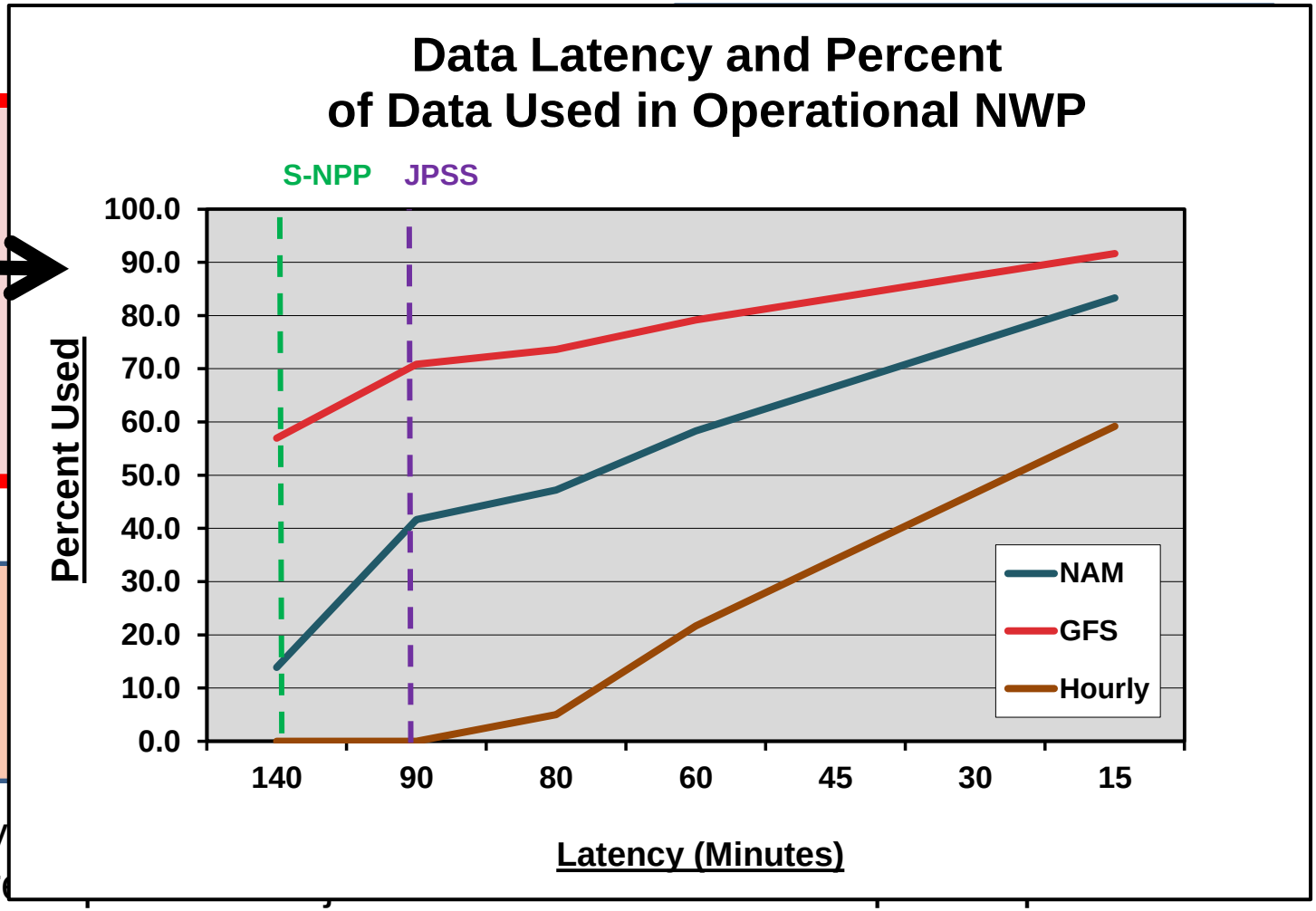
- **NOAA operational Line Offices have provided true latency values for their respective critical products (focusing on the near-real time requirements)**

30 minutes

NWS:
ATMS
SDR
TDR
CrIS SDR
VIIRS Imagery EDR
(Alaska Region)

60 minutes

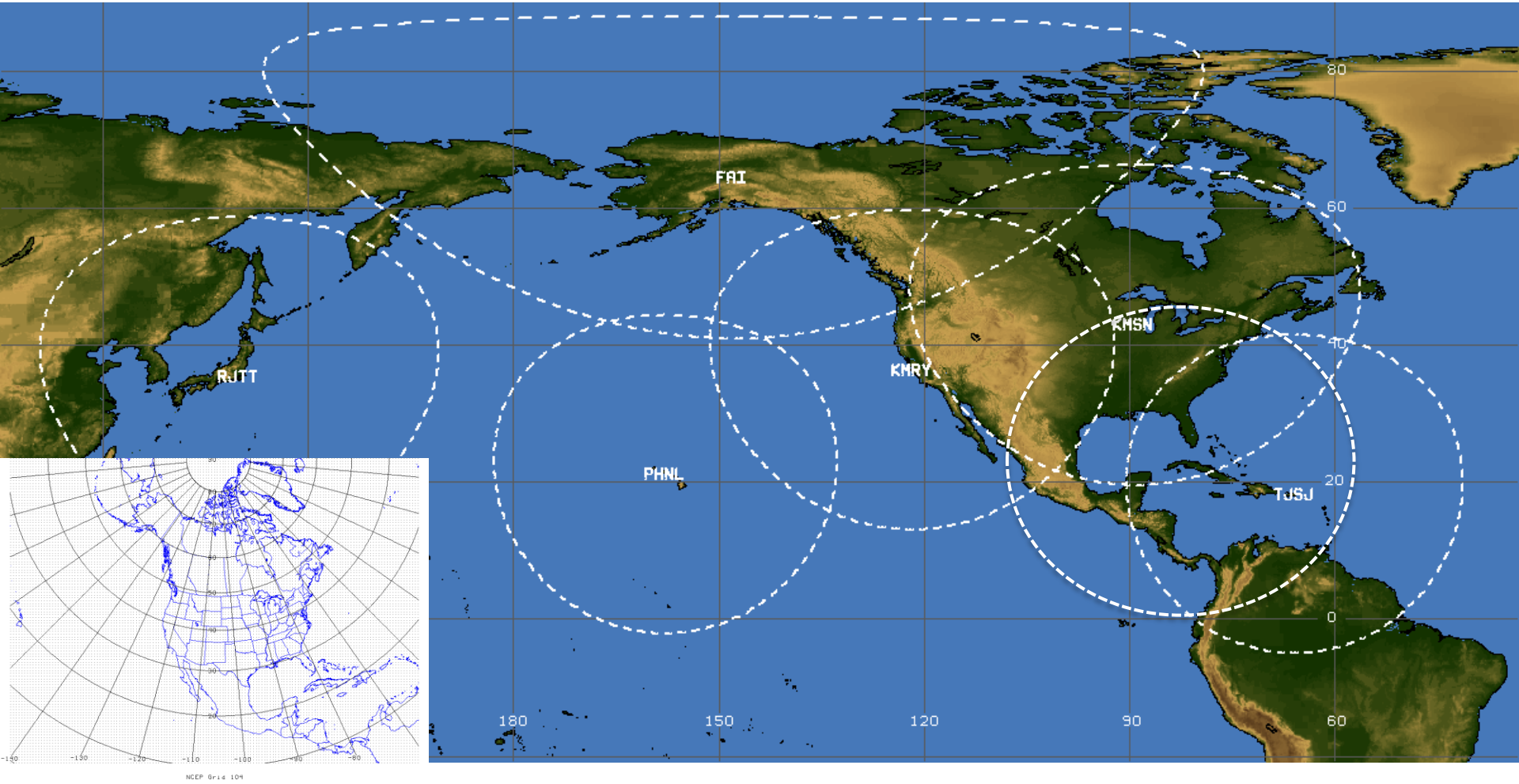
NESDIS:
SARSAT Data



Any latency
minutes) ar

Future JPSS Proving Ground DB Demo

CSPP sites



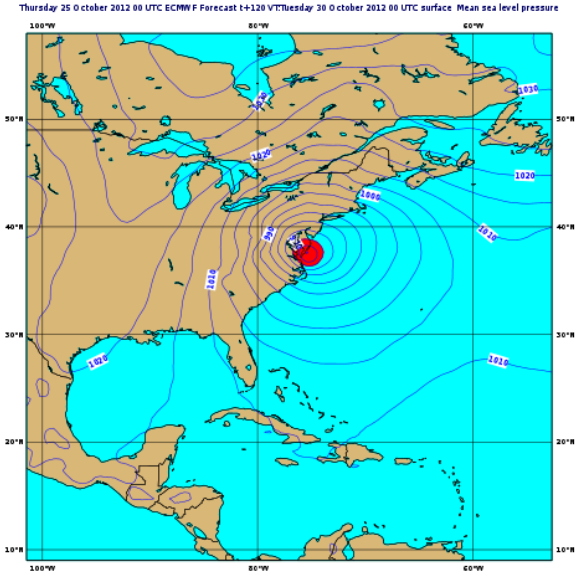
Community Supported Processing Package (CSPP) demonstrates the value of 30 minute latency for nowcasting and regional forecast model applications by establishing a network of direct readout stations

Forecasts of Hurricane Sandy without Polar satellites

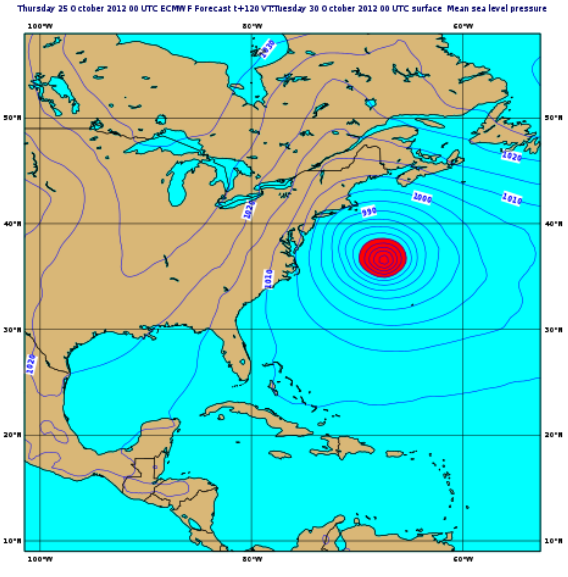
Tony McNally

ECMWF forecasts of Mean Sea Level Pressure, **5 days in advance** of the 30th October 2012 for the landfall of Hurricane Sandy. Forecasts from an assimilation system **with no polar satellites** fail to predict the landfall of the storm on the US east coast.

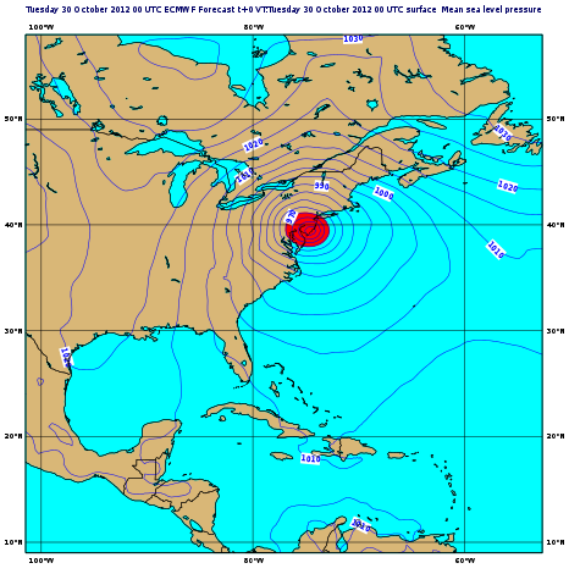
ECMWF OPS



NO POLAR SAT



VERIFICATION



5 day forecast: Base time 2012-10-25-00z **Valid Time: 2012-10-30-00z**

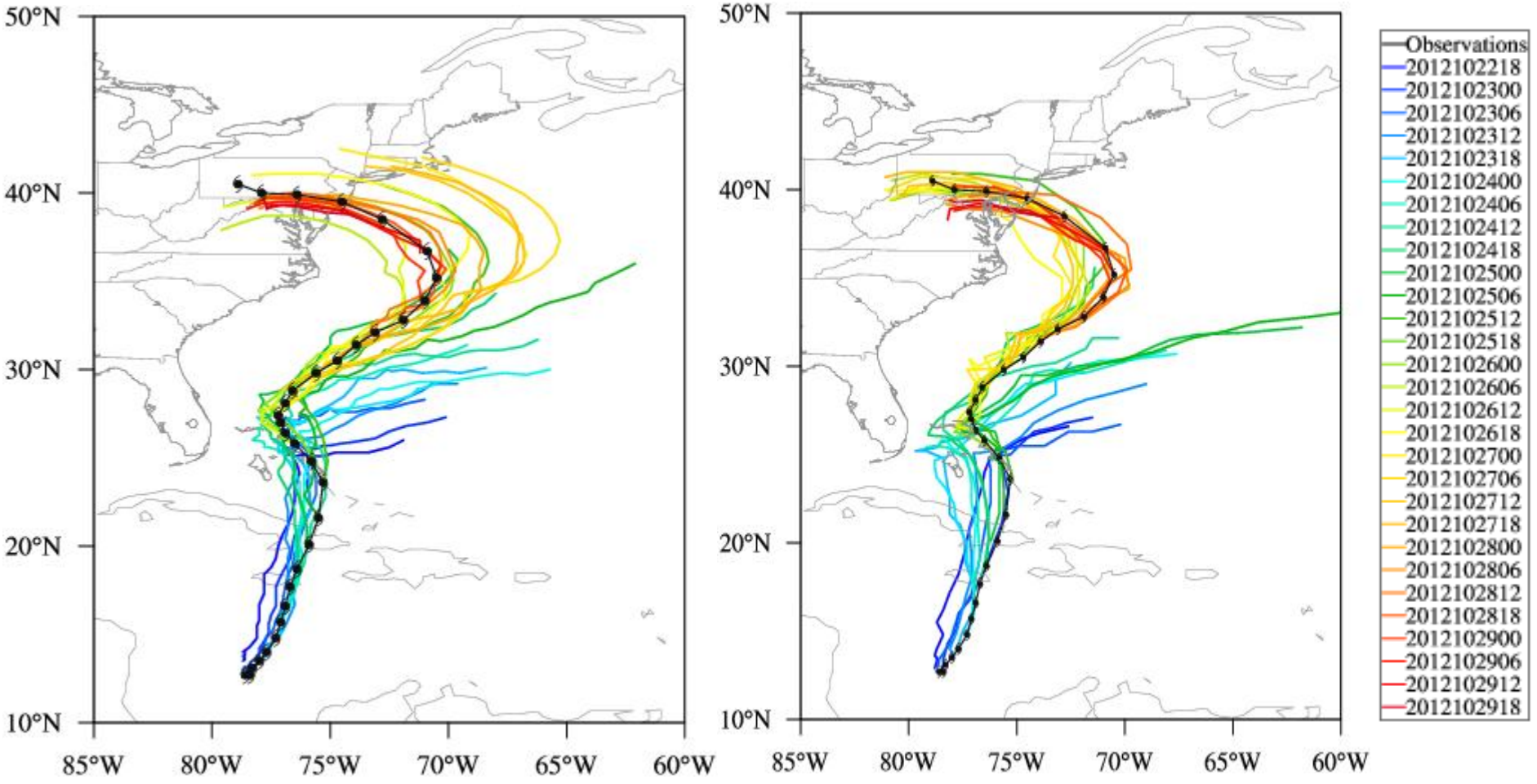
39

Direct Assimilation of ATMS into Models

Experimental results showing improvements in Sandy track forecasts from Hurricane Weather Research Forecast model with ATMS

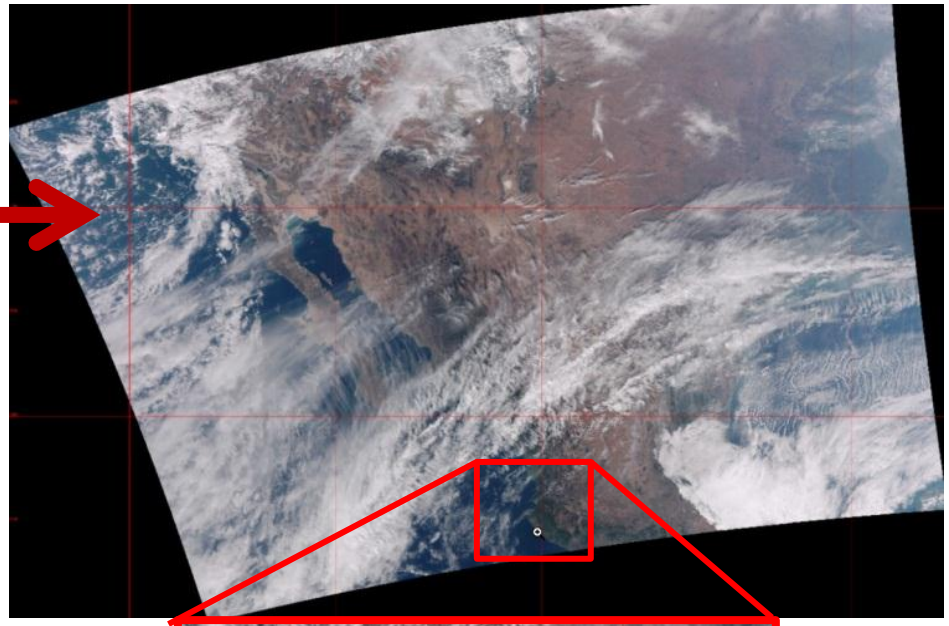
HWRF-NCEP Operational

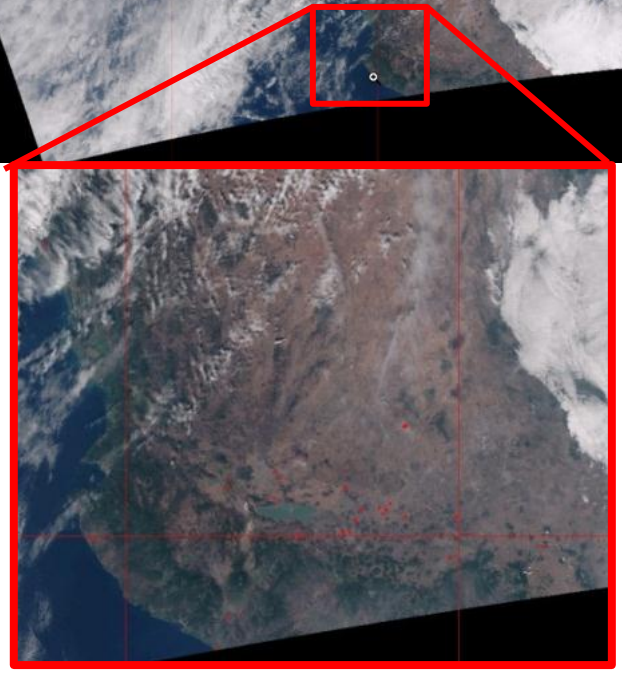
Modified HWRF-NCEP with ATMS



Thanks to Fuzhong

JPSS Supporting Wildfire Detection through VIIRS



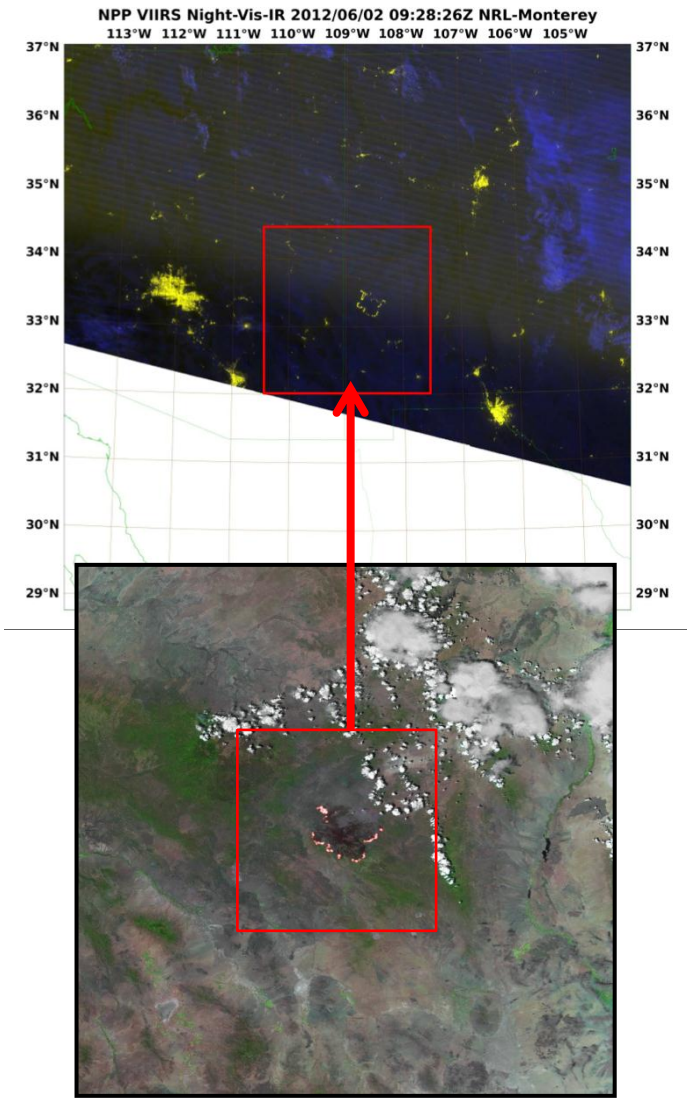


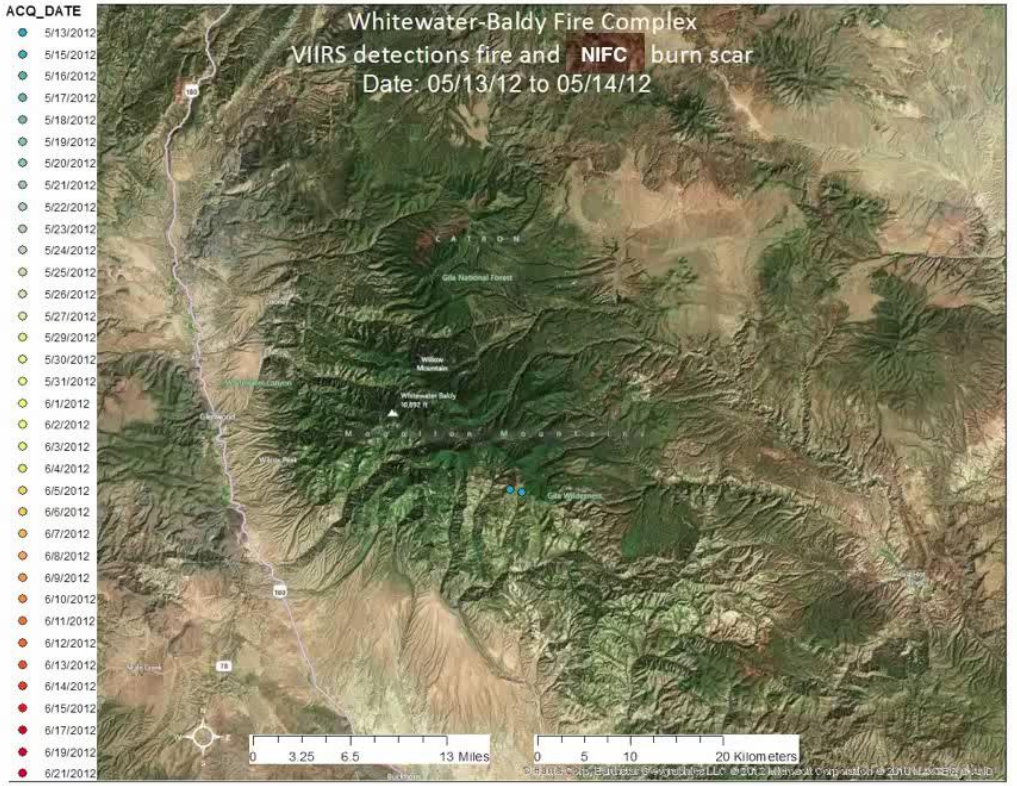
The National Weather Service and US Forest Service both depend on VIIRS data to predict, identify and monitor wildfires.

JPSS has funded development and implementation of the Active Fires program through its Proving Ground.

From Imagery to Decision Support

2 June 2012



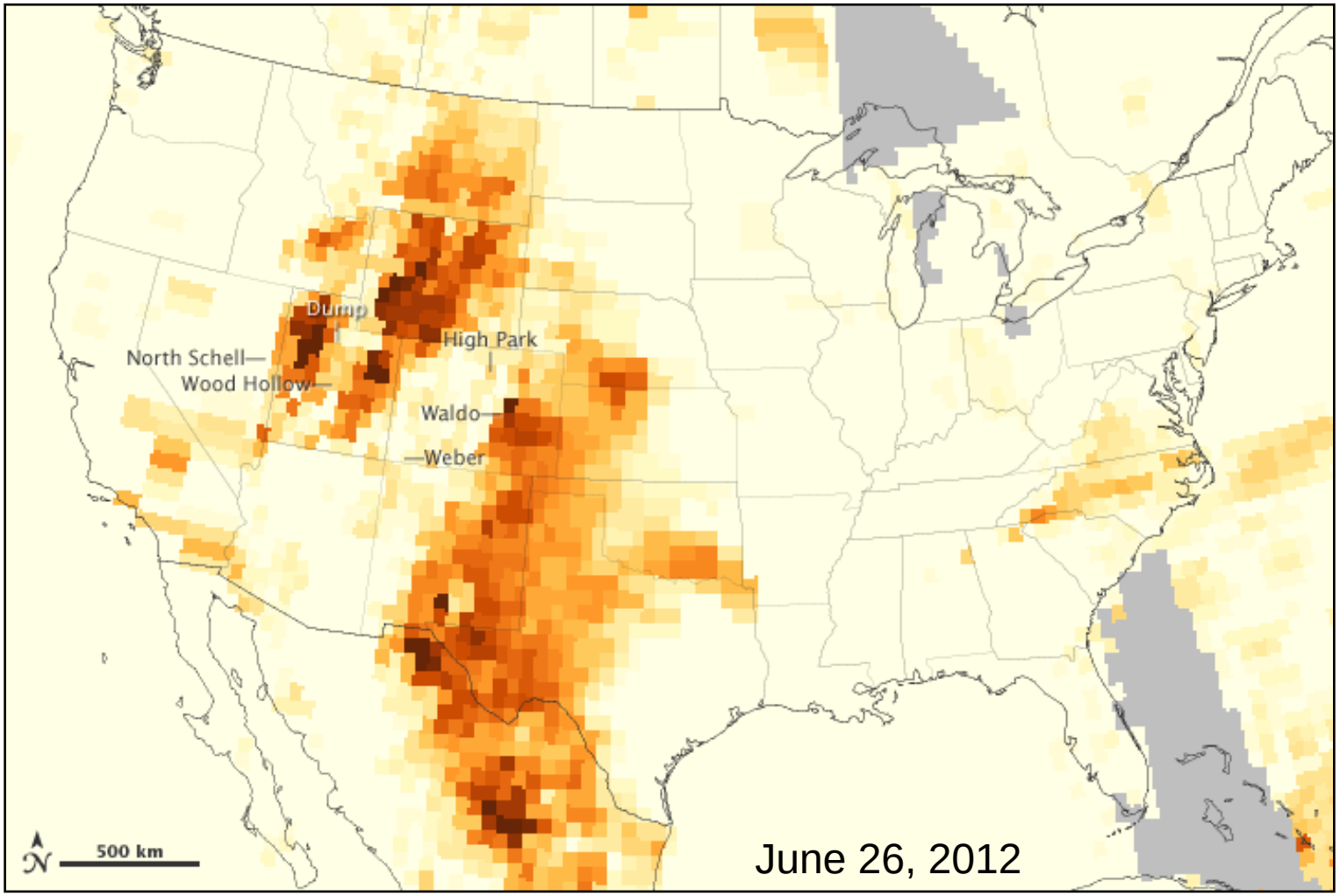


Time lapse of VIIRS detected fire locations and National Interagency Fire Center burn scar

JPSS works with NWS and USFS to better integrate satellite fire detection to improve decision support tools

Credit: Ivan Csiszar, STAR

JPSS Supporting Wildfire Detection through OMPS



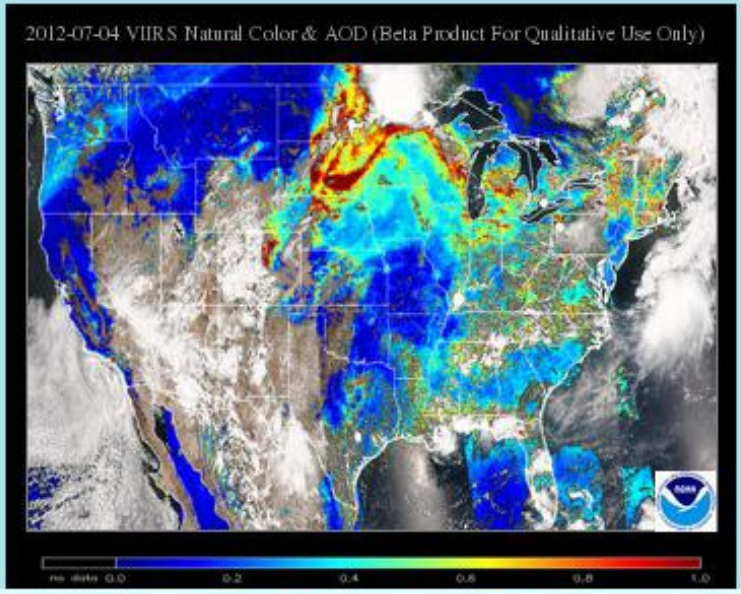
Credit: NASA image by Jesse Allen, using OMPS data provided courtesy of Colin Seftor (SSAI)
Source: http://earthobservatory.nasa.gov/IOTD/view.php?id=78389

GOES-R/JPSS Air Quality Proving Ground Demo

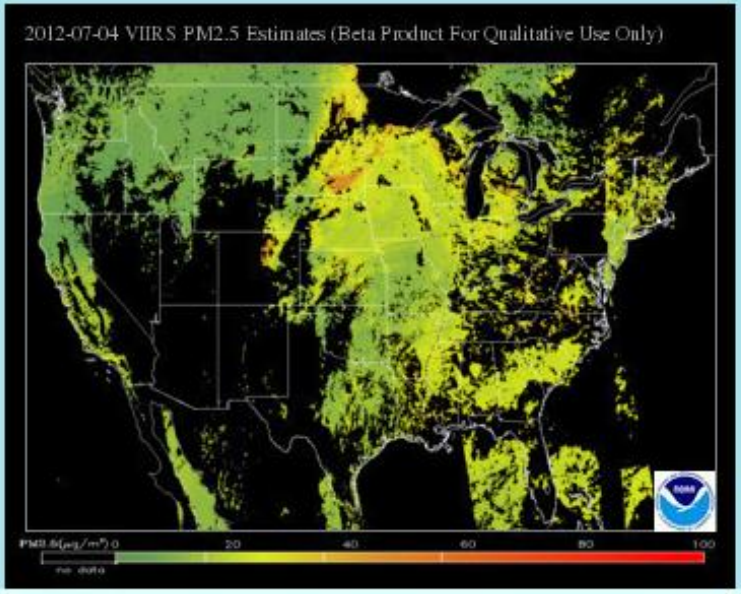
Product Description

GOES-R | VIIRS

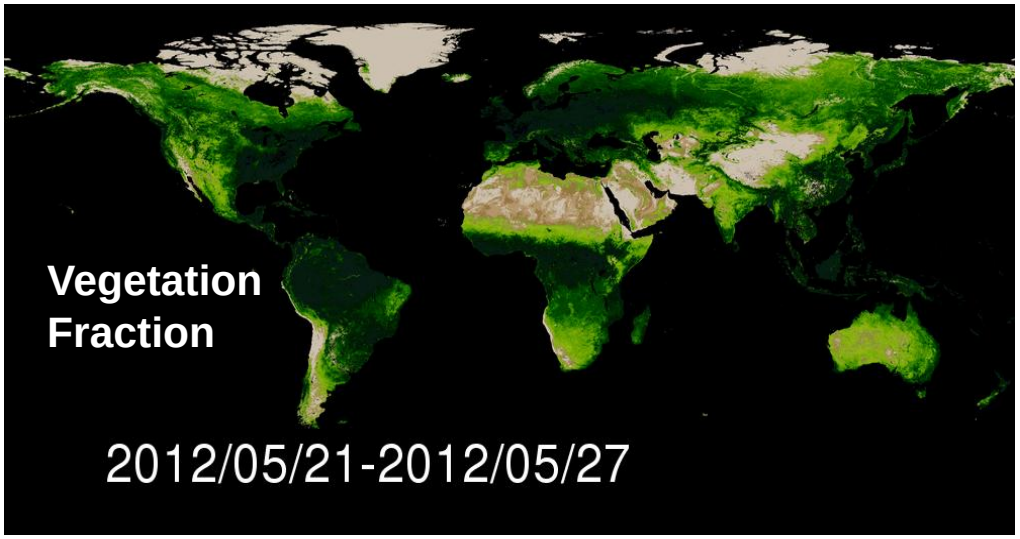
VIIRS Natural Color and Aerosol Images

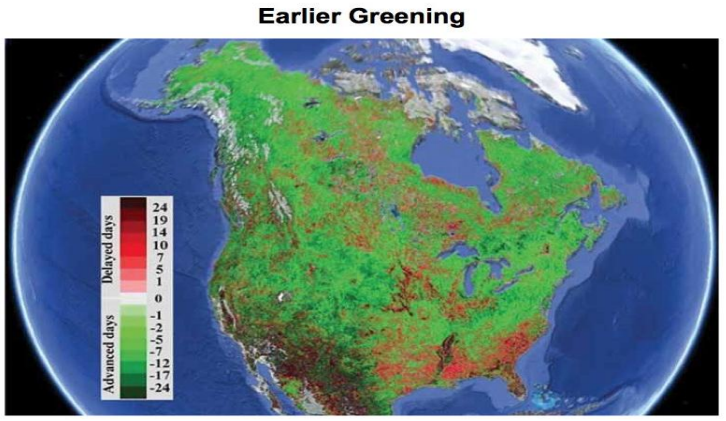


PM2.5 Estimates From VIIRS AOD

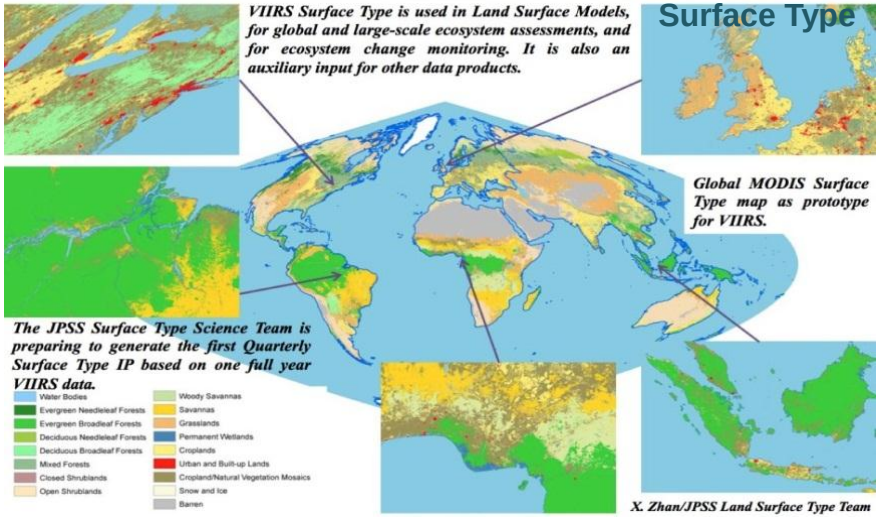


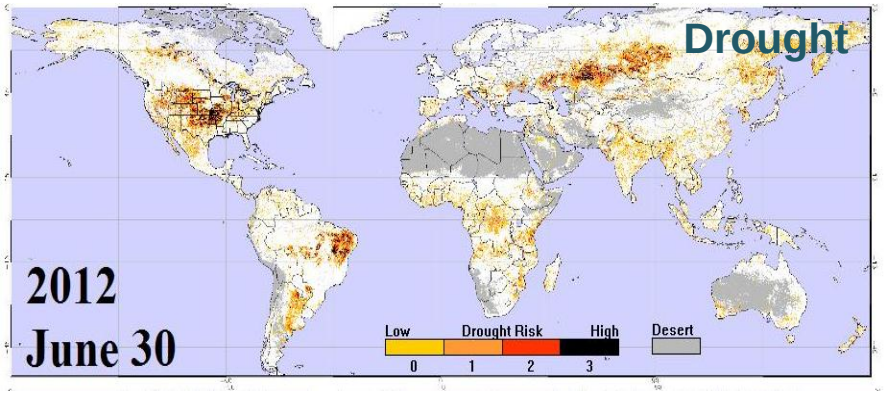
JPSS Supporting Land and Ecosystem Monitoring through VIIRS



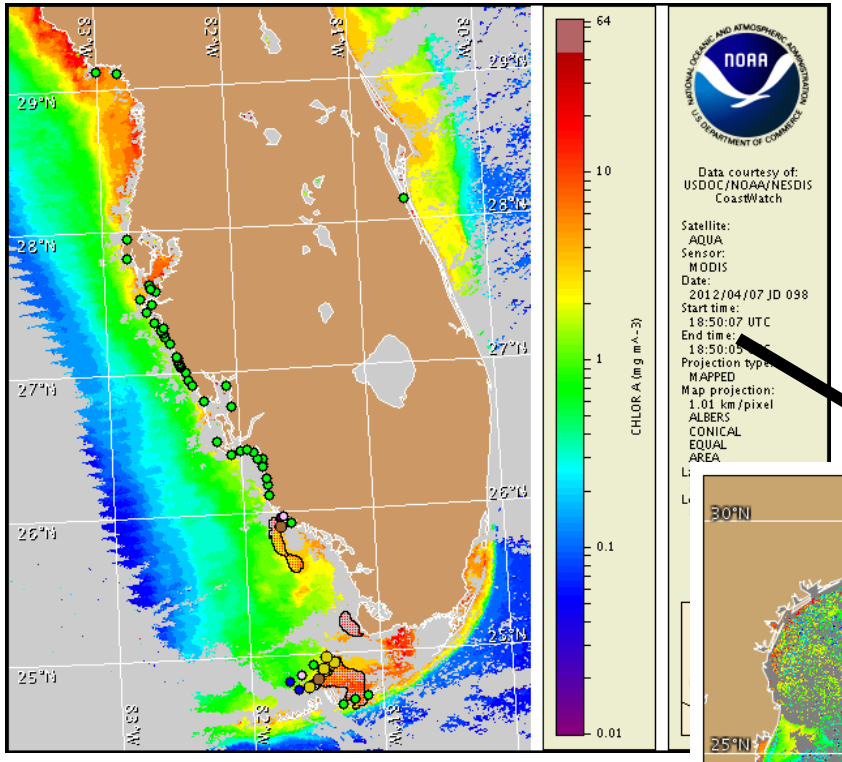


Understanding climatically-induced changes allows for NOAA to better support land, ecosystem and drought monitoring to provide decision support to US stakeholders





JPSS Supporting NOAA Operational Harmful Algal Bloom Alerts



Operational Conditions Reports

Southwest Florida

Monday, April 30, 2012

A patchy harmful algal bloom remains offshore of the gulfside region of the Lower to Middle Florida Keys. Patchy very low impacts are possible tomorrow through Wednesday, with moderate impacts possible today. No additional impacts are expected alongshore southwest Florida today through Wednesday, May 2.

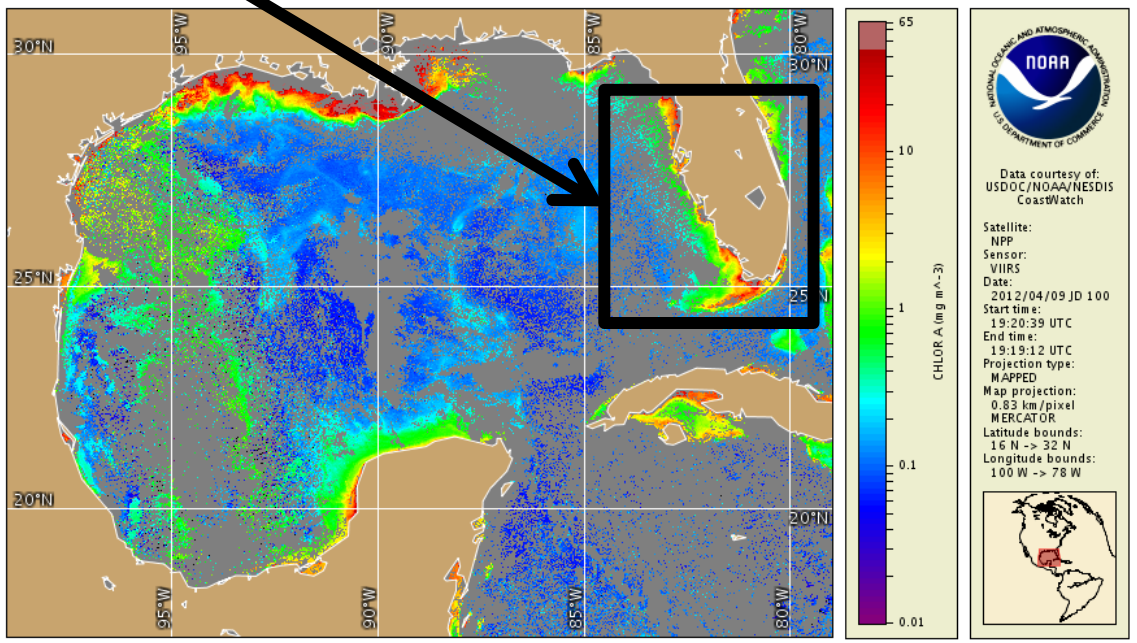
Northwest Florida

Monday, April 30, 2012

There are currently no reports of harmful algae in this region. No impacts are expected. Last report: Tuesday, March 01, 2011

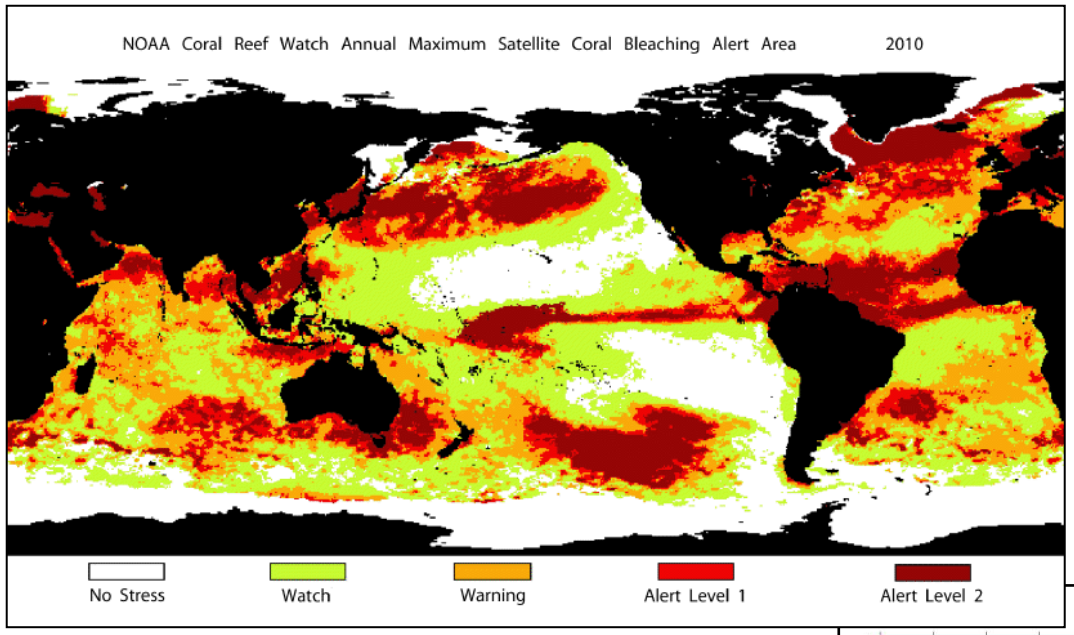
East Florida

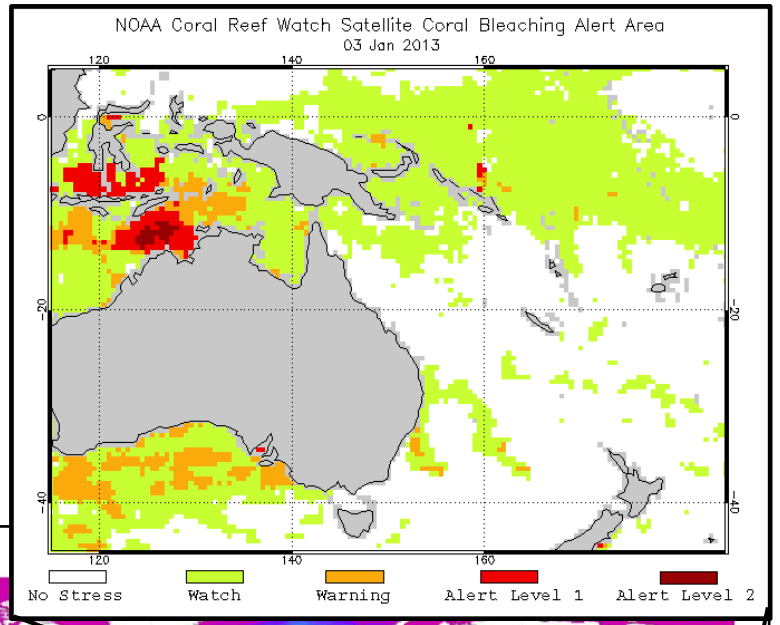
Monday, April 30, 2012

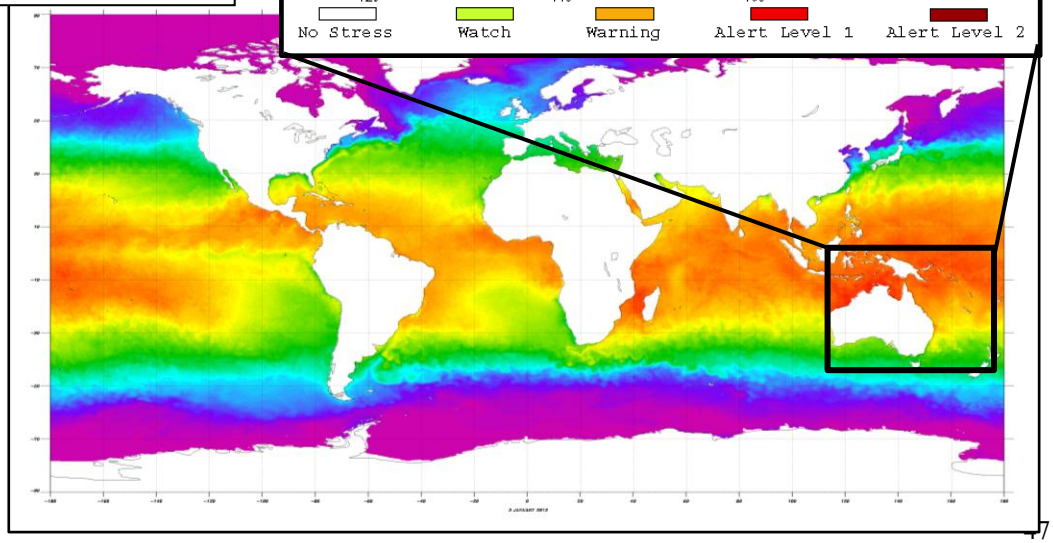


Through operation

JPSS Supporting Healthy Oceans and Reefs through VIIRS



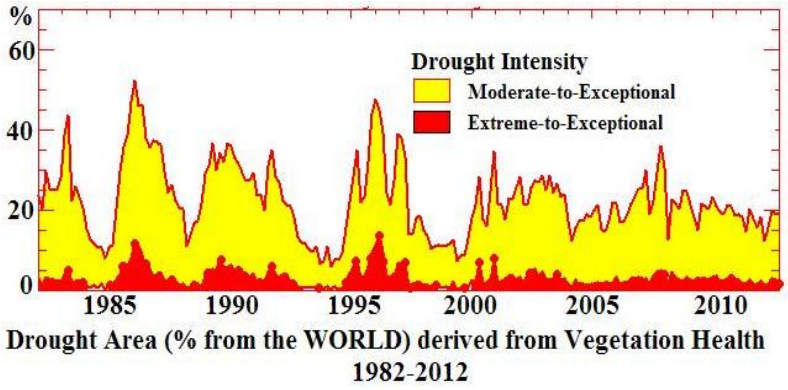




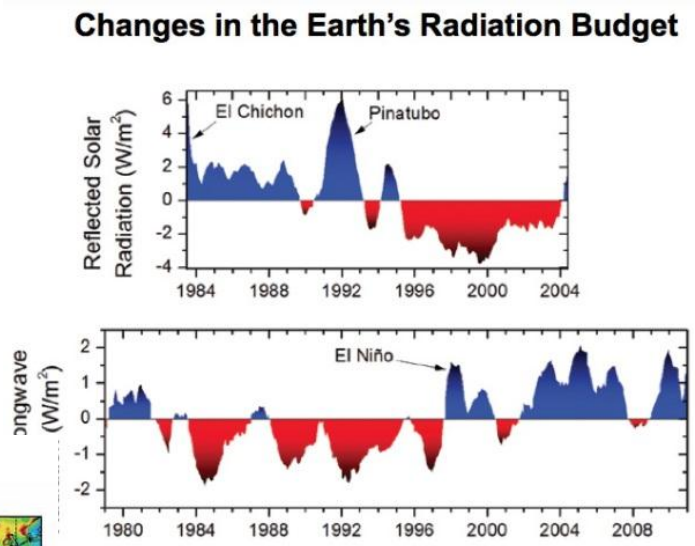
In 2010, major bleaching occurred to coral reefs throughout much of the Indian Ocean, Southeast Asia, the Coral Triangle, and the Caribbean

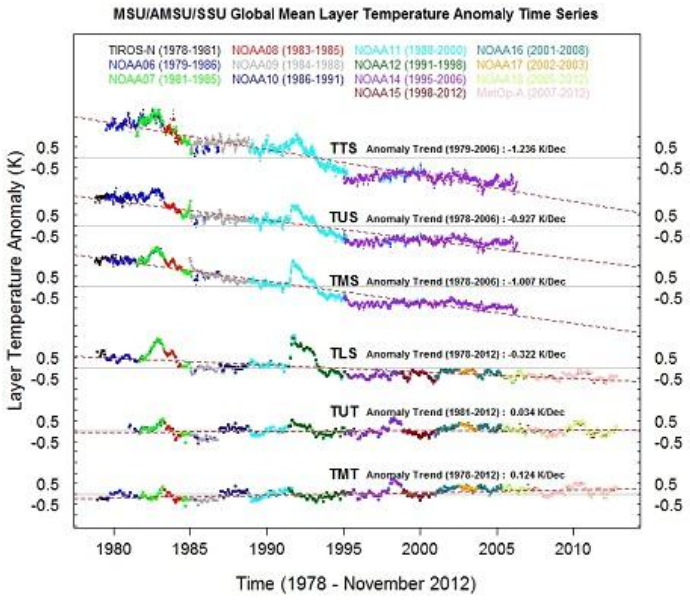
Coral Reef Watch (using AVHRR) provide a nowcast of current bleaching environmental conditions as derived from sea surface temperature anomalies

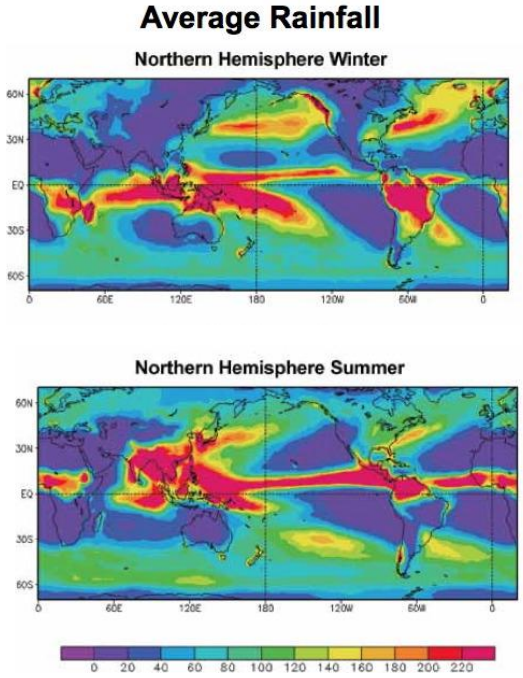
JPSS provides Critical Observations to Extend Climate Data Records

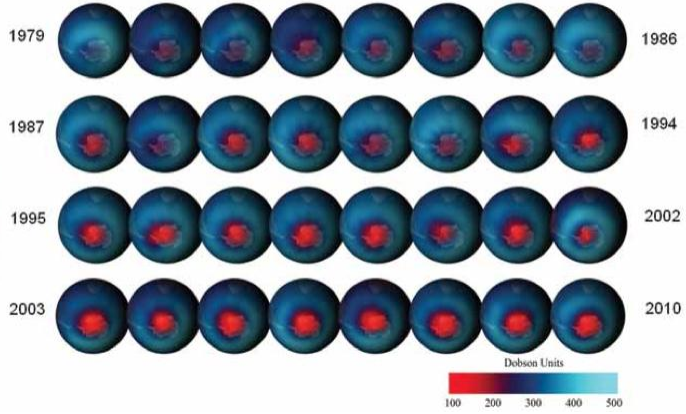


Drought Area (% from the WORLD) derived from Vegetation Health
1982-2012









JPSS PGRR NWS Roster

Andy Harris	Assimilation of VIIRS SSTs and Radiances into Level 4 Analyses
Ralph Petersen	CriS/ATMS sounding applications for nearcasting severe weather over Alaska
Jeff Key	Development, Generation, and Demonstration of New JPSS Ice Products in Support of a National Ice Center JPSS Proving Ground and Risk Reduction Activity
Ivan Csiszar	A rapid delivery system of enhanced VIIRS active fire data for fire management and fire weather applications
Shobha Kondragunta	Application of NPP/VIIRS Fire and Aerosol Optical Thickness (AOT) Products for Air Quality (focus on Alaska)
Donglian Sun	Application of NPP/JPSS Data for Improved Flood Mapping and Inundation Area Estimates
Naira Chaouch	River and Lake Ice mapping using NPP/JPSS VIIRS sensor To support NOAA NWS
Jerry Zhan	Enhance agricultural drought monitoring using NPP/JPSS land EDRs fro NIDIS
Steve Miller	'Seeing the Light': Exploiting VIIRS Day/Night Band Low Light Visible Measurements in the Arctic
Andy Heidinger	Advancing Nighttime VIIRS Cloud Products with the Day/Night Band
Bill Smith	CrIS/ATMS sounding applications for nowcasting convective initiation for severe weather and turbulence (focus on Alaska)
Fuzhong Weng	Improve Hurricane Structure Monitoring and Intensity Forecast Using NPP ATMS and GCOM-W AMSR2
Jun Li	Near real-time assimilation system development for improving tropical cyclone forecasts with NPP/JPSS soundings
Mark Demaria	Application of JPSS Imagers and Sounders to Tropical Cyclone Track and Intensity Forecasting
Huang	Community Satellite Processing Package
Boukabara	JCSDA - improvements to data assimulation
Wolf/Schott	JPSS Risk Reduction VIIRS ABI algorithms
conell	Virtual Lab training in coordination with CGMS and WMO
Pingping Xie	Infusing JPSS PMW Retrievals to CMORPH Precipitation Estimates for Improved Weather, Climate, and Water Applications
Heinrich	Alaska Proving Ground - Direct Readout Exploitation
Spangler	COMET Education Resources - Training modules for JPSS

Track Progress via Quarterly Reports and Monthly JPSS Science Seminars

JPSS Proving Ground Periodic Reporting

Project Team: CIRA, GINA

Reporting Period: Oct 2012 - Dec 2012

Team Lead: Steve Miller

Team Members: Tom Heinrichs, Gary Hufford, Jay Cable, Jiang Zhu, Dayne Broderson, Tom Lee

Project Title: 'Seeing the Light': Exploiting VIIRS Day/Night Band Low Light Visible Measurements in the Arctic

Executive Summary

This project focuses on the demonstration of the unique and unprecedented capabilities of the Visible/Infrared Imager/Radiometer Suite (VIIRS) Day/Night Band (DNB) low-light visible nighttime imagery in the Arctic, with a special emphasis on exploiting moonlight illumination during the Winter season when conventional solar illumination is limited or unavailable and where polar-orbiter temporal refresh is most practical to operational users. These demonstrations will be conducted in close cooperation with University of Alaska-Fairbanks (UAF) Geographic Information Network of Alaska (GINA) and its suite of operational partners, and coordinated under the auspices of the Satellite Proving Ground (and specifically in association with the High Latitude Proving Ground) to ensure a close connection and dialogue with end users. New capabilities for detecting low cloud/fog, snow cover, volcanic ash, sea ice and ice-free passages, auroral boundaries, and other parameters exploiting the 740 m spatial resolution of the VIIRS/DNB low-light visible measurements coupled for the first time with spatially/temporally co-located multi-spectral shortwave and thermal infrared bands, will be demonstrated in near real-time as part of this research project. Application development will leverage tools and techniques for lunar availability and irradiance prediction as well as hands-on experience with VIIRS/DNB data gained via concurrent participation in the JPSS VIIRS Cal/Val program. Training on DNB imagery capabilities and interpretation for these new observations is an implicit component of this work, and examples derived from this research will provide subject matter for those involved in formal training efforts connected with the Proving Ground and more generally with the environmental satellite user community.

Overall Status: Green

	Green [1] (Controlled)	Yellow [2] (Caution)	Red [3] (Critical)	Deviation Summary [4]
Budget	☒	☐	☐	None
Schedule	☒	☐	☐	Late start (Sep, due to funding arrival in late Aug)
Scope	☒	☐	☐	Expand opportunistically to other regions

[1] *Project is within budget, scope and on schedule.*
[2] *Project has deviated slightly from the plan but should recover*
[3] *Project has fallen significantly behind schedule, is forecast to be significantly over budget, and/or has taken on tasks that are out of scope.*
[4] *Details of deviations provided in subsequent section of report*

Comments:

Scheduled Milestones / Deliverables

Year 1 Milestones	Approved Schedule	Forecasted Completion	Actual Completion	Status
Milestone Title				
Meet with user groups, present DNB capabilities, determine schedule & protocol for interactions.	Jul-Sep 2012	30 Sep 2012	5 Oct 2012	completed
Develop automated processing scripts for basic DNB imagery.	Jul-Dec 2012	31 Dec 2012		Nearly completed
Conduct selected DNB nocturnal product demonstrations.	Sep 2012-April 2013	30 Apr 2013		Started
Gather initial user feedback	Jan-Jun 2013	30 Jun 2013		Pending

Note: Bold milestones are key external project deliverables

Status Definition: Green (will meet schedule), Yellow (milestone will be delayed), Red (milestone cannot be met on current path)

Accomplishments & Plans

Accomplishments during this Reporting Period:

- An important aspect of this project is demonstrating the utility of non-solar sources of visible light.
- Continue to participate in other aspects of VIIRS (cal/val), including interactions with Northrop Grumman (NG) on various aspects of Day/Night Band performance, including the problem of stray light which will affect high latitudes for a substantial portion of the year. NG is developing a statistically based stray light correction algorithm which should improve performance. An important role of this project will be to evaluate this algorithm in the high latitude regions and provide feedback and suggestions to NG on performance and issue resolution. This is a good example of synergy between the various projects. During the period, Stephanie Weiss (NG) produced stray-light-corrected granules for assessment of night glow imagery performance. We found that night glow reflectance features were retained, although some artifacts that appear to be related to the corrections appear as well.
- Work continues on evaluation of the lunar reflectance product, which will play a central role in quantitative DNB applications. A copy of the code was supplied to SSEC/CIMSS who are doing Alaska Region DNB demonstrations in AWIPS. This expanded interaction will assist in evaluating the lunar reflectance product.

Conclusions

An understanding of how JPSS data used throughout NOAA is pivotal to evolving and maintaining a robust satellite mission that serves the needs of all Line Offices.

- JPSS now is able to move ahead with plans for its next generation of satellites, beginning with JPSS-1, a follow-on to Suomi-NPP which is now flying, with a vetted set of NOAA requirements and avid user community.
- The level of criticality from each NOAA Line Office affords JPSS the ability to quantify product importance to the broader operational and research communities.

JPSS continues to engage the NOAA user community, ensuring that both the best product and new, enhanced products (via the Proving Ground) are made available in the most timely manner possible.